INTERACT™

MODEL ONE HOME COMPUTER

SERVICE MANUAL

INTERACT™

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Introduction

In order to facilitate rapid diagnosis and repair of the Model One Home Computer, Interact has designed the system as an assembly of eight sub-assemblies or "modules". Each module contains the components which perform a specific system function. The serviceperson's responsibility is to identify the faulty module and replace it. No further repairs should be attempted at the service center. All faulty modules are to be returned to the factory with a completed Factory Service Tag.

The process of identifying a malfunctioning module is simplified by the use of the "Trouble Locator Chart" on pages 4 and 5. This chart contains the most common symptoms of module failure and lists the repair procedure appropriate for each. To confirm that a suspected module is faulty or to locate the cause of symptoms not listed on the chart, load and run the Interact™ 8K or 16K Test Tape. Instructions for use of the test tapes begin on page 23 of this service manual.

Once the serviceperson has determined that a module is faulty, he should return that module to the factory for repair and provide a Factory Service Tag to accompany it. An example of the Factory Service Tag is shown on page 3 of this manual. It is essential that all items shown on the tag be filled out completely. More tags can be obtained by photo-copying the example on page 3 or by writing Interact Electronics, Inc., P.O. Box 8140, Ann Arbor, Michigan 48107.

Faulty modules should be mailed to:

Interact Electronics, Inc.
2548 Packard Road
Ann Arbor, MI 48104
ATTN: Service Dept.

The parts of the Model One system are identified in Figure 1. The remaining figures in this manual depict the disassembled modules. The basic eight modules are as follows:

1. Joystick assembly (1 of Figure 1)
2. Antenna switch box (2 of Figure 1)
3. AC power adaptor (3 of Figure 1)
4. Lower housing sub-assembly (Figure 2)
5. Upper housing sub-assembly (Figures 3,4 and 5)
6. Control panel sub-assembly (Figure 6)
7. Cassette sub-assembly (Figure 8)
8. Main electronics sub-assembly (Figure 10)



FIGURE 1--Assembled Model One Home Computer

FACTORY SERVICE TAG

Service Center Name: ______________________________

Service Center Address: ______________________________

Date: ____________________

Sub-Assembly: (Check One)

Upper housing	______	Main electronics	______
Lower housing	______	AC adaptor	______
Cassette	______	Joystick	______
Control panel	______	Antenna switch box	______

Symptom: ______________________________

Date of Purchase: ______________

Interact Model One Serial # ______________

Memory 8K ________, 16K ________ Check One

Shipping Instructions

Pack faulty modules carefully in secure packaging to prevent damage during shipment. Enclose separate Factory Service Tag for each module. Be sure that specific symptom is noted on tag. Mark shipping carton "FRAGILE".

Never mail modules by parcel post.

Faulty modules should be mailed to:

Interact Electronics, Inc.
2548 Packard Road
Ann Arbor, MI 48104

ATTN: Service Dept.

Symptom	Probable Location	Repair/Replacement Procedure
No picture or sound and no pilot light	AC Adaptor	Replace AC Adaptor (Page 15)
	or ON-OFF switch	Replace Upper Assembly (Page 6)
No picture or sound but light is on	Main Electronics Sub-Assembly	Replace Main Electronics (Page 15)
Poor picture and/or sound	If TV set is properly tuned,* main electronics out of alignment	Replace Main Electronics (Page 15)
No color	If TV set is properly tuned,* main electronics clock out of adjustment or main electronics failure	Replace Main Electronics (Page 15)
Cassette transport doesn't run	Control Panel Sub-assembly	Replace Control Panel Sub-assembly (Page 12)
	or Motor faulty	Replace Transport Sub-assembly (Page 12)
	or Motor not getting voltage	Replace Main Electronics (Page 15)
Cassette tapes don't read properly	Tape head dirty	Clean Tape Head (see Owner's Guide)
	or Tape head out of alignment	Align Tape Head (Page 18, 19)
	or Transport mechanism binding	Replace Transport Sub-assembly (Page 12)
	or Read circuitry faulty	Replace Main Electronics (Page 15)
Keys on keyboard fail to function	Keyboard faulty	Replace Control Panel Sub-assembly (Page 12)
	or Main electronics faulty	Replace Main Electronics (Page 15)

* It may be adviseable to try the unit with a different TV set.

Symptom	Probable Trouble Location	Repair/Replacement Procedure
Sounds not clear due to excessive hum	If TV set is properly tuned,* main electronics out of alignment or main electronics failure	Replace Main Electronics (Page 15)
TV Screen has intermittent dots	Intermittent memory-RAM failure	Replace Main Electronics (Page 15)
Unable to write information back on tape	Read/Write switch dirty	Replace Transport Sub-assembly (Page 12
	or Read/Write circuitry faulty	Replace Main Electronics (Page 15)
Unit fails after short period of time	Main Electronics failure	Replace Main Electronics (Page 15)
Cassette door pops out of track	Cassette Housing	Replace door in track (Page 12)

* It may be adviseable to try the unit with a different TV set.

1. <u>Upper Assembly Removal and Installation</u>

In order to remove any module from the computer console, this procedure must be completed first:

1. Turn the Interact unit over so that the bottom of the lower assembly is showing, as in Figure 2. Place it on a soft surface to avoid marring the unit.
2. Remove the six (6) screws at the corners and top and bottom center of the lower housing.
3. Carefully holding the top and bottom assemblies together, turn the unit back over so that the control panel is up, as in Figure 3.
4. Lift the upper assembly up at approximately a 45° angle so that the internal cables are exposed, as in Figure 4.
5. Remove all connections and free the upper assembly as in Figure 5.
6. The upper assembly can be installed by reversing steps 1 through 5, beginning with step 5.

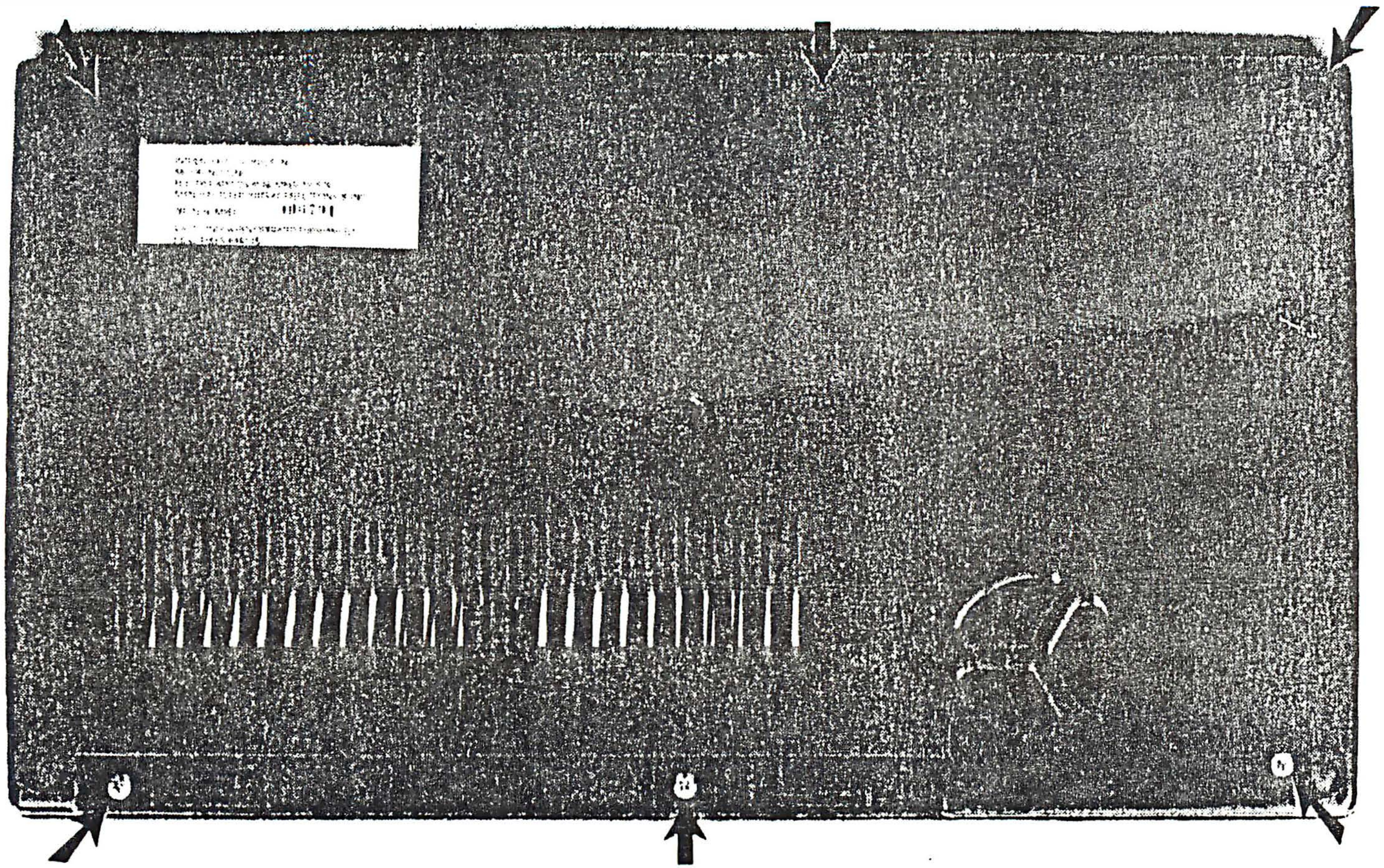


FIGURE 2--Lower Housing Assembly

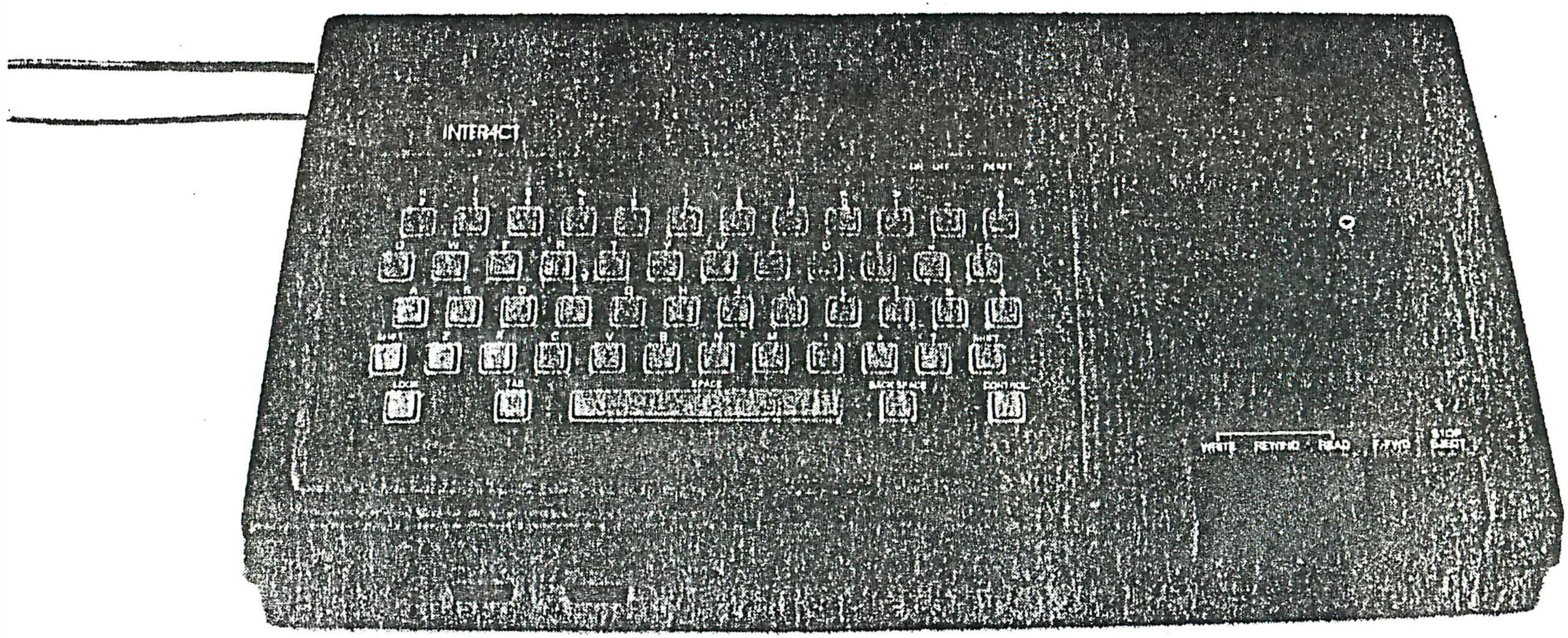


FIGURE 3--Model One - Upper Assembly Closed

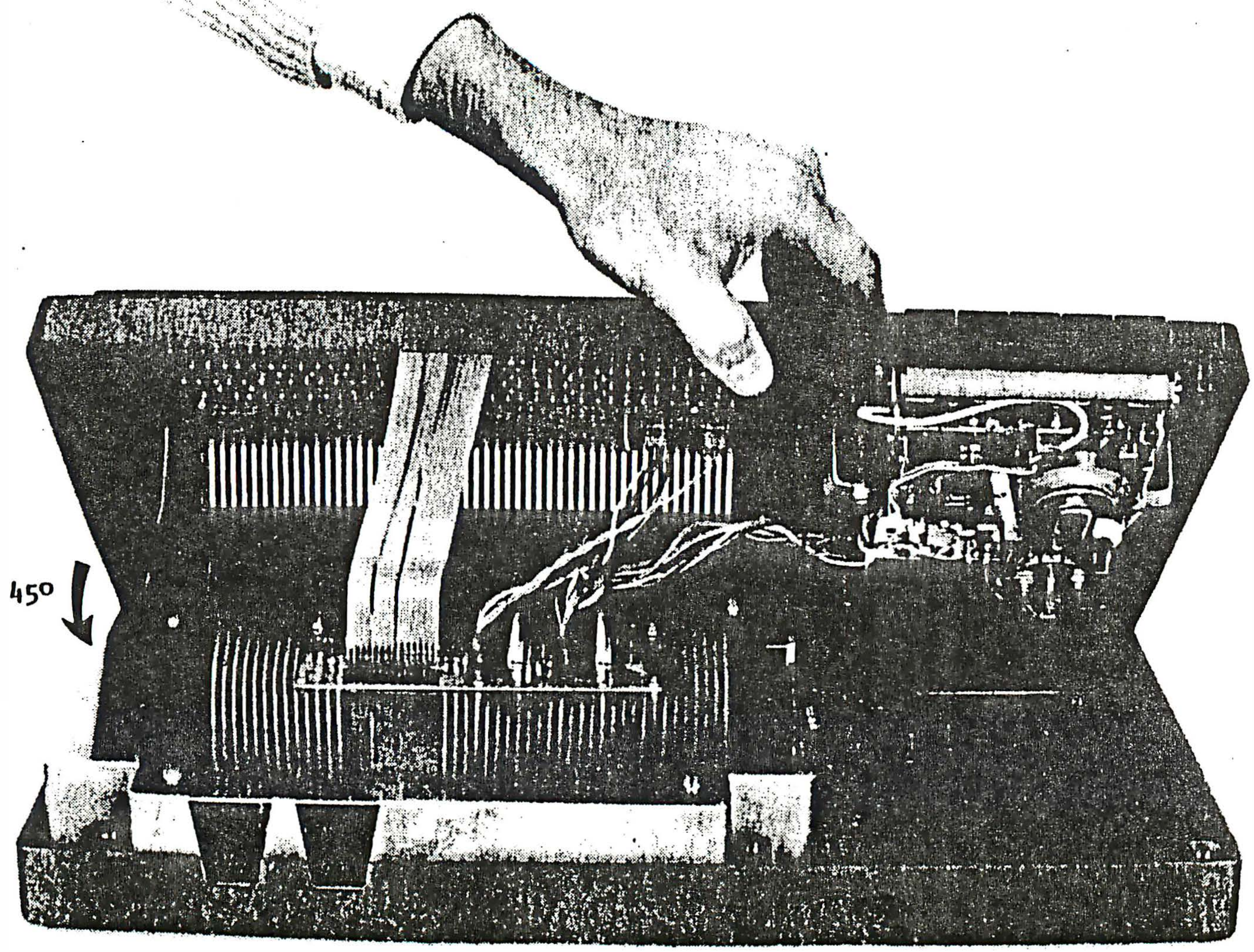


FIGURE 4--Upper Assembly - Partly Open

Tinnerman Nuts

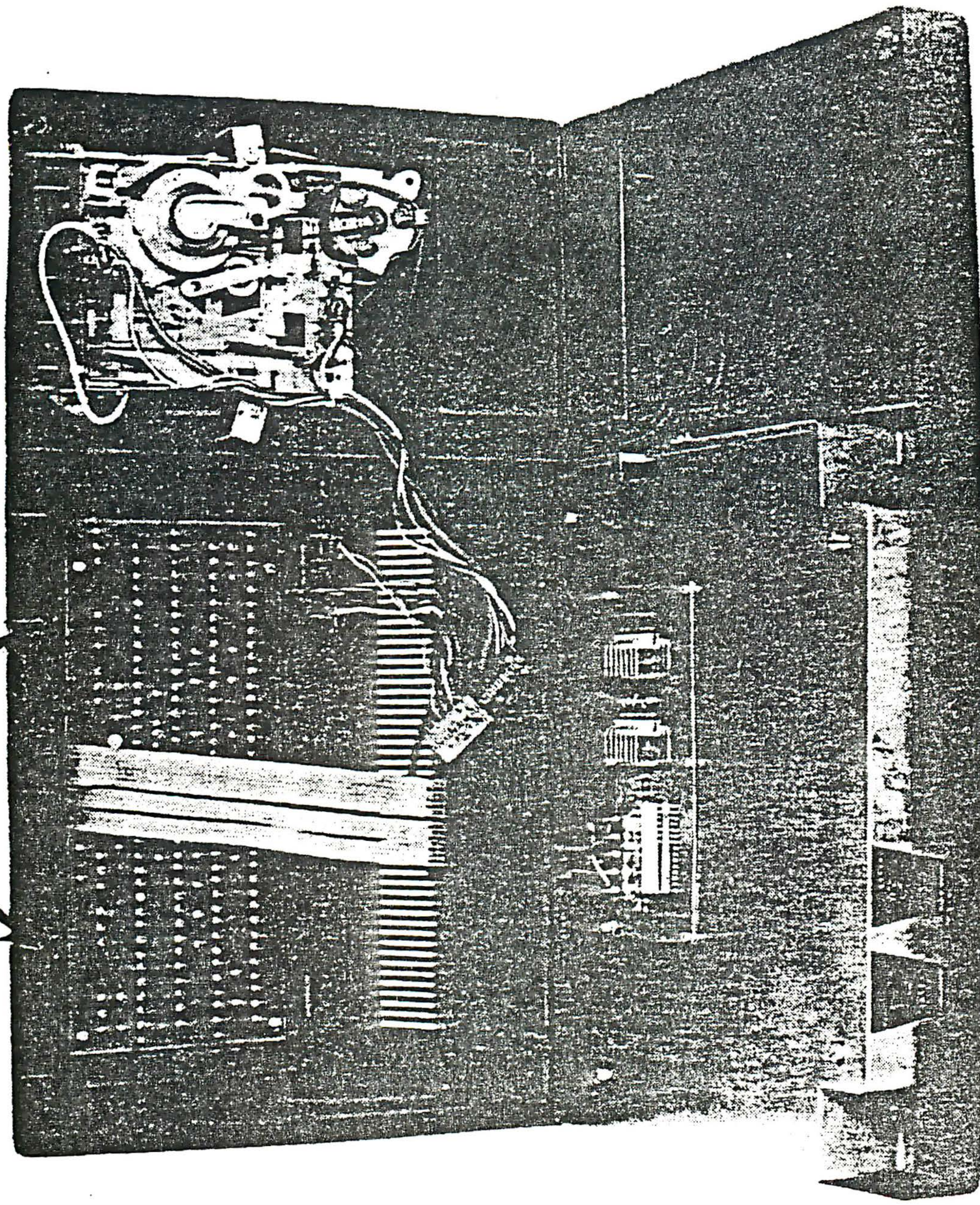


FIGURE 5--Upper Assembly - Fully Open

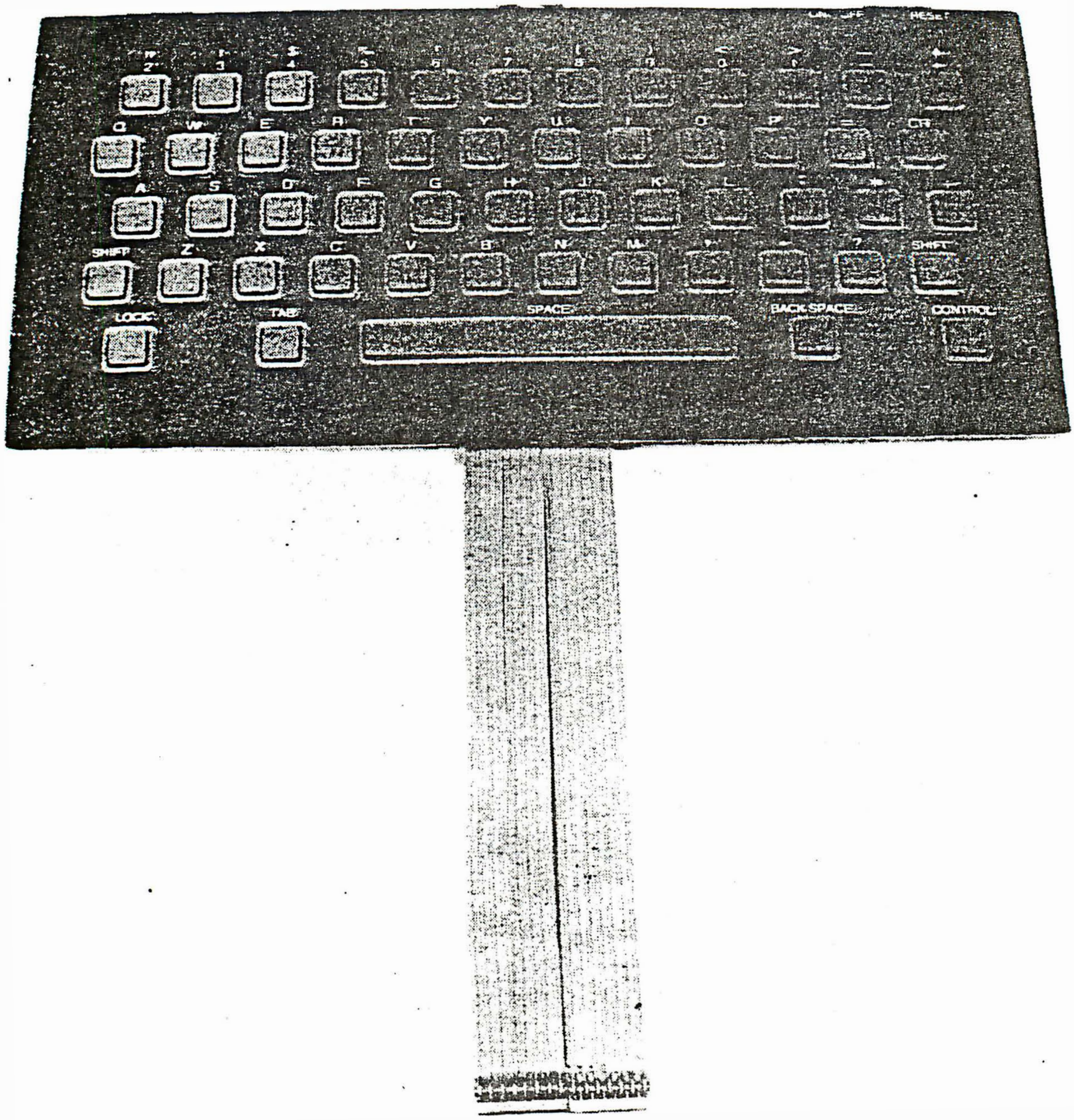


FIGURE 6--Control Panel Sub-assembly

2. Control Panel Sub-assembly Removal and Installation

1. Complete procedure 1 on page 6 (Upper Assembly Removal and Installation).
2. Remove the two (2) tinnerman nuts shown in Figure 5. Lift the Control Panel Sub-assembly (see Figure 6). Care must be taken in removing the nuts because too much stress will cause the locating plastic pins to break. The nuts can be removed quite easily by using long nose pliers and pinching the ends toward the pin.
3. The Control Panel Sub-assembly can be installed by reversing steps 1 through 2, beginning at step 2.

3. Cassette Transport Sub-assembly Removal and Installation

1. Complete procedure 1 on page 6 (Upper Assembly Removal and Installation).
2. Remove the transport brackets shown in Figure 7. Lift the cassette transport out of the transport housing. (See Figure 8.)
3. The Cassette Transport Sub-assembly can be installed by reversing steps 1 and 2, beginning at step 2.
4. Cassette door can be inserted back in track by loosening the transport brackets (Figure 7) until transport housing has enough slack from upper assembly to allow pivot arms of cassette door to slide into track notch. It is usually easier to do this with door spring removed.

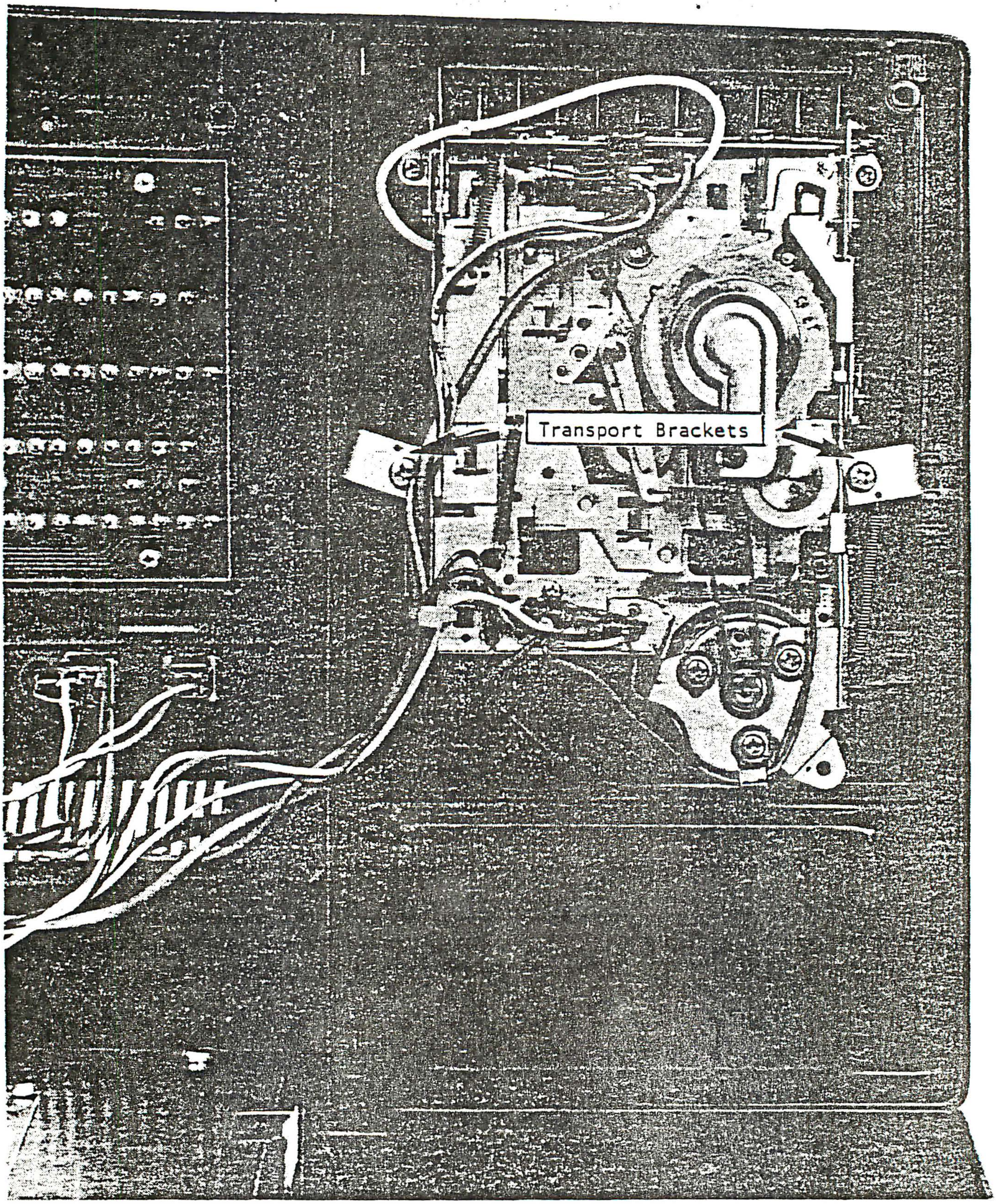


FIGURE 7--Cassette Transport In Housing

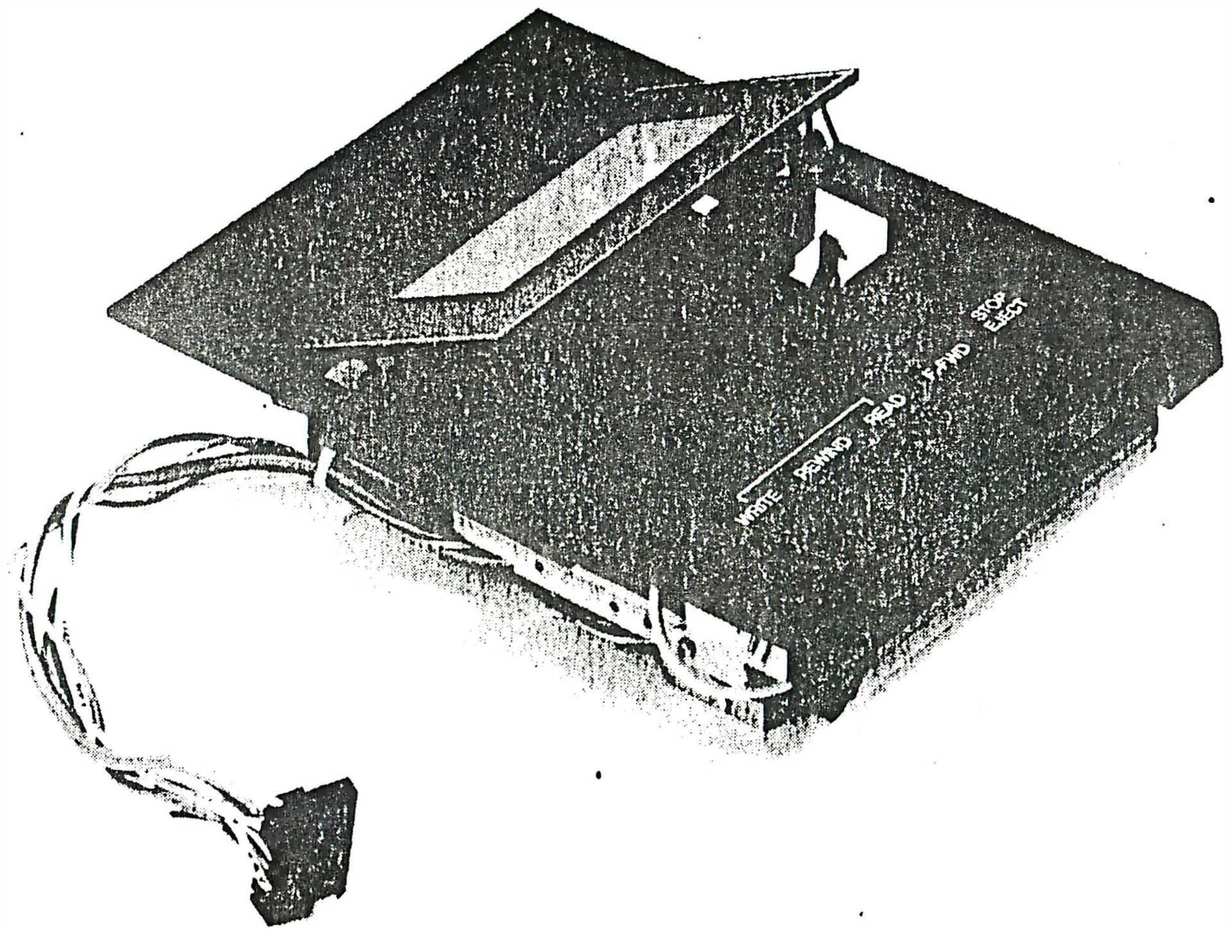


FIGURE 8--Cassette Transport Sub-assembly

4. AC Power Adaptor Sub-assembly Removal and Installation

1. Complete procedure 1 on page 6 (Upper Assembly Removal and Installation).
2. Remove each of the five (5) wires on the AC adaptor cord shown in Figure 9.
3. Remove the cord clamp from the top of the Main Electronics Sub-assembly. Remove the AC adaptor from the lower assembly.
4. The AC adaptor assembly can be installed by reversing steps 1 through 3, beginning at step 3. Note: Make certain color code of wiring is followed—from left to right:

   White, Black, Orange, Red, Blue

5. Main Electronics Sub-assembly Removal and Installation

1. Complete procedure 1 on page 6 (Upper Assembly Removal and Installation).
2. Remove the four (4) screws shown in Figure 9 and lift the Main Electronics Sub-assembly out of the lower assembly. (See Figure 10.)
3. The Main Electronics Sub-assembly can be installed by reversing steps 1 through 2, beginning at step 2.

AC Adaptor Cord
NOTE: Check color code

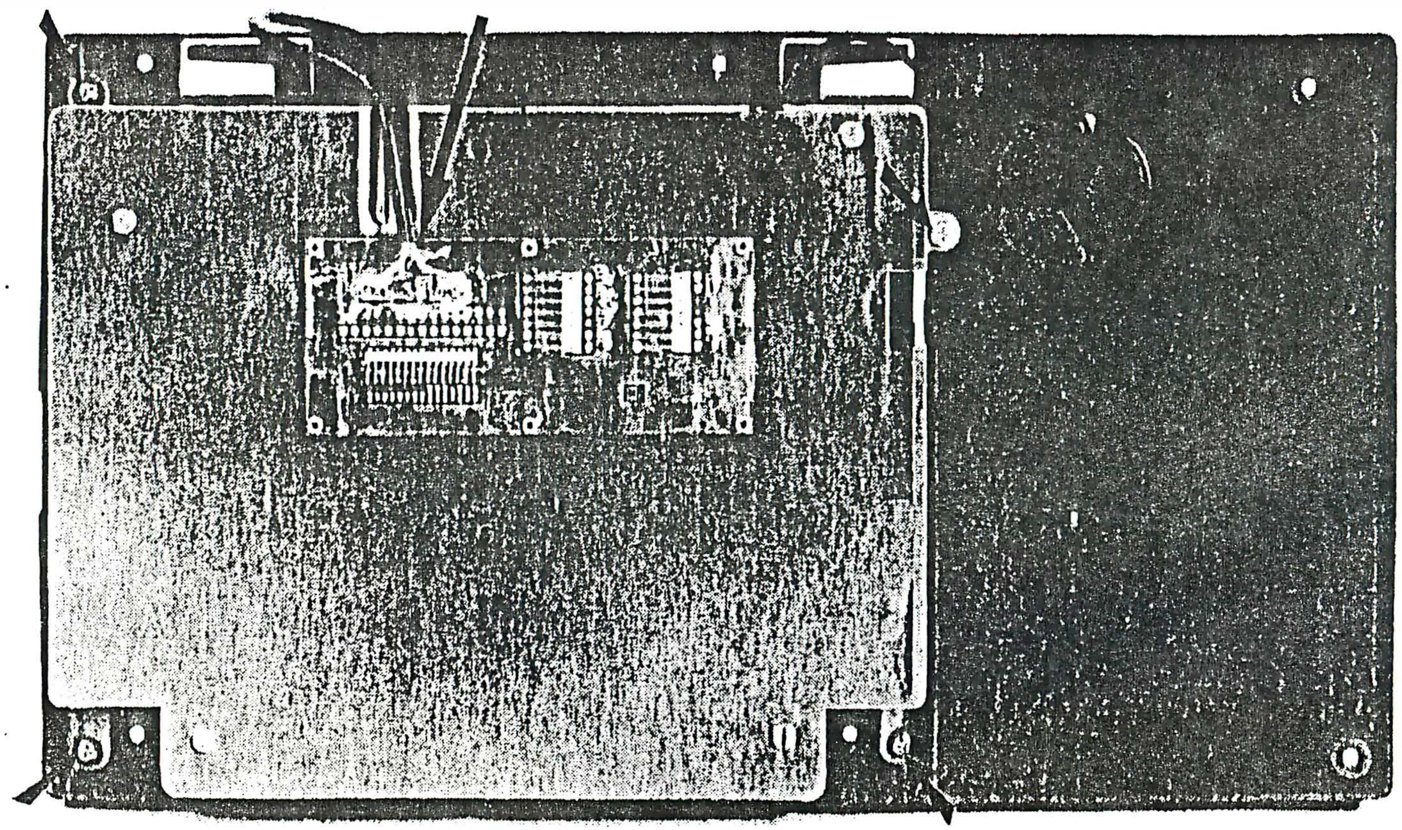


FIGURE 9--Lower Assembly

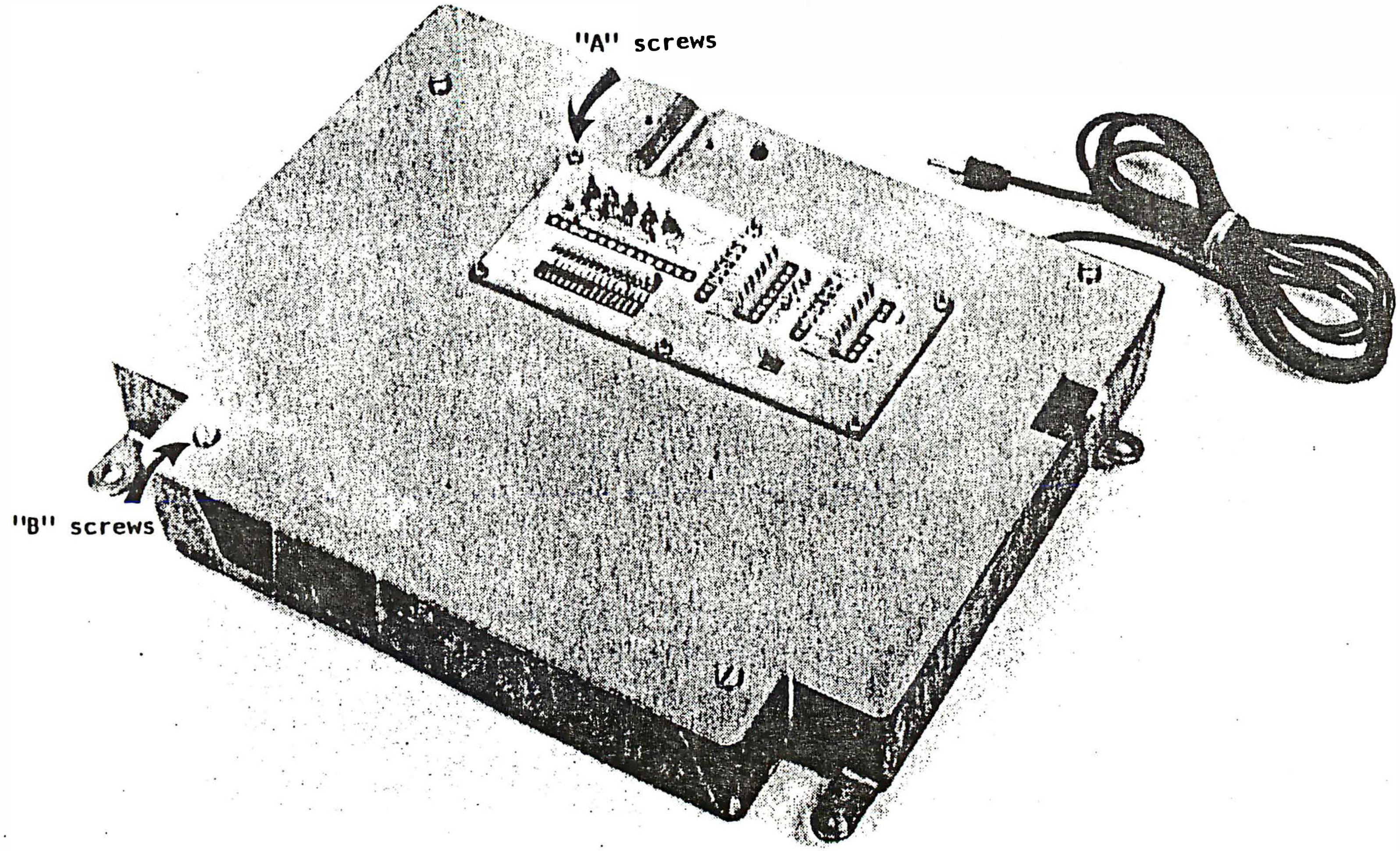


FIGURE 10--Main Electronics Sub-assembly

6.0 Tape Head Alignment Procedure

This procedure can be accomplished only after all system faults have been resolved according to sections 1 through 5 of this manual. The equipment necessary to perform a head alignment includes:

Interact Head Alignment Tape

Television Receiver

Antenna Switch Box

Small Phillip's Head Screwdriver

Begin by connecting the Interact computer console to the television as described in the Model One Owner's Guide. Proceed as you would for normal operation by completing the following steps:

1. Turn on the power ON/OFF switch.
2. Depress the button labelled RESET.
3. Confirm that the message DEPRESS L TO LOAD appears on the screen. If this message does not appear on the screen, a system fault exists and must be repaired before alignment can be performed.
4. Load the Head Alignment Tape into the cassette holder (see the Owner's Guide for details) and depress the letter "L" on the keyboard. Press the REWIND cassette button and allow a few seconds for the tape to rewind. Press the READ cassette button. The cassette spindles should begin to turn slowly. As the tape reads in, a steady tone is produced. Insert the small Phillip's screwdriver into the access hold in the cassette transport housing (see Figure 11.)
5. When sound is heard through TV set, adjust fine tuning of TV set for optimum sound quality.

6. Rotate the screwdriver clockwise and counter-clockwise while listening to the sound. The sound should peak at maximum level within a quarter turn in either direction. Stop at a point where the peak is reached.

7. Attempt to load a standard Interact application cassette into the system. (See the Owner's Guide for details.) If the preceding alignment procedure has been accomplished correctly and the cassette is not defective, no further loading difficulty should occur.

8. Since the head alignment screw will move with usage and time, it is best to place a drop of liquid screw-tight (e.g. LOC-TITE) on the screw head and mating surface. This can be accomplished by removing the cassette tape and pressing the "READ" button. This moves the head towards the door opening. Now with a mirror and a small brush, a drop of liquid screw-tight can be applied to the screw head surface.

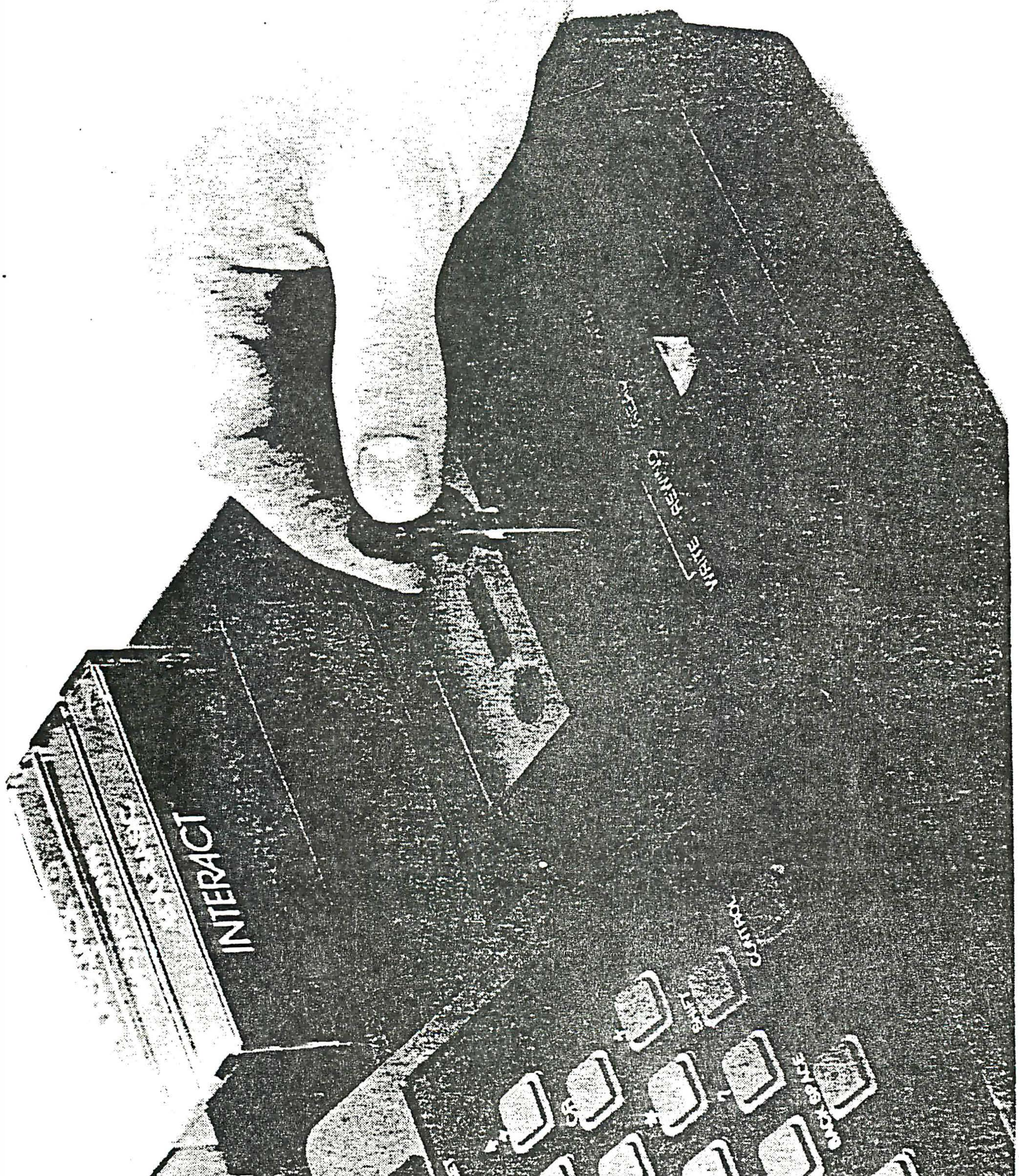


FIGURE 11--Aligning Cassette Tape Head

Circuit Board Repairs

1. After following the disassembly procedures of sections 1 through 5, certain further repairs can be made by factory authorized service centers. These repairs require removal of the metal top plate from the Main Electronics Subassembly shown in Figure 10. The following procedure must be followed for proper removal of top plate:
   - A. First remove the six "A" screws shown in Figure 10.
   - B. Next remove the four "B" screws.
   - C. Now carefully lift the small connector board about an inch away from the top plate.
   - D. Tilt the left front corner of the connector board down into the top plate hole.
   - E. Move the top plate until the entire connector board is able to go through the hole.
   - F. The circuit board is now open for general repairs.
2. The following repairs can be made by an authorized service center on the main circuit board.
   - A. RAM replacements
   - B. Microprocessor (8080) replacement
   - C. ROM (2316) replacement
   - D. Regulator replacements
   - E. Sound chip (76477) replacement
   - F. Tuning RF section
   - G. Cleaning read/write switch
   - H. ON/OFF switch and LED replacement

A diagnostic ROM, support jumper cables and repair data will be made available to those service centers who are authorized to make board repairs. Repair data will include block diagrams, schematics, parts lists and waveform analysis to facilitate service repair.

Figure 12 shows the locations of most of the components mentioned above. Care must be taken in removal, handling and insertion of any chips on the board as follows:

1. Remove chips with the aid of a chip removal tool, carefully observing orientation before removal.
2. Handle all chips with grounding strip on wrist to prevent static electricity from burning out the chip.
3. Make certain power is not applied when chips are removed or inserted.
4. Carefully insert chip with the proper orientation.

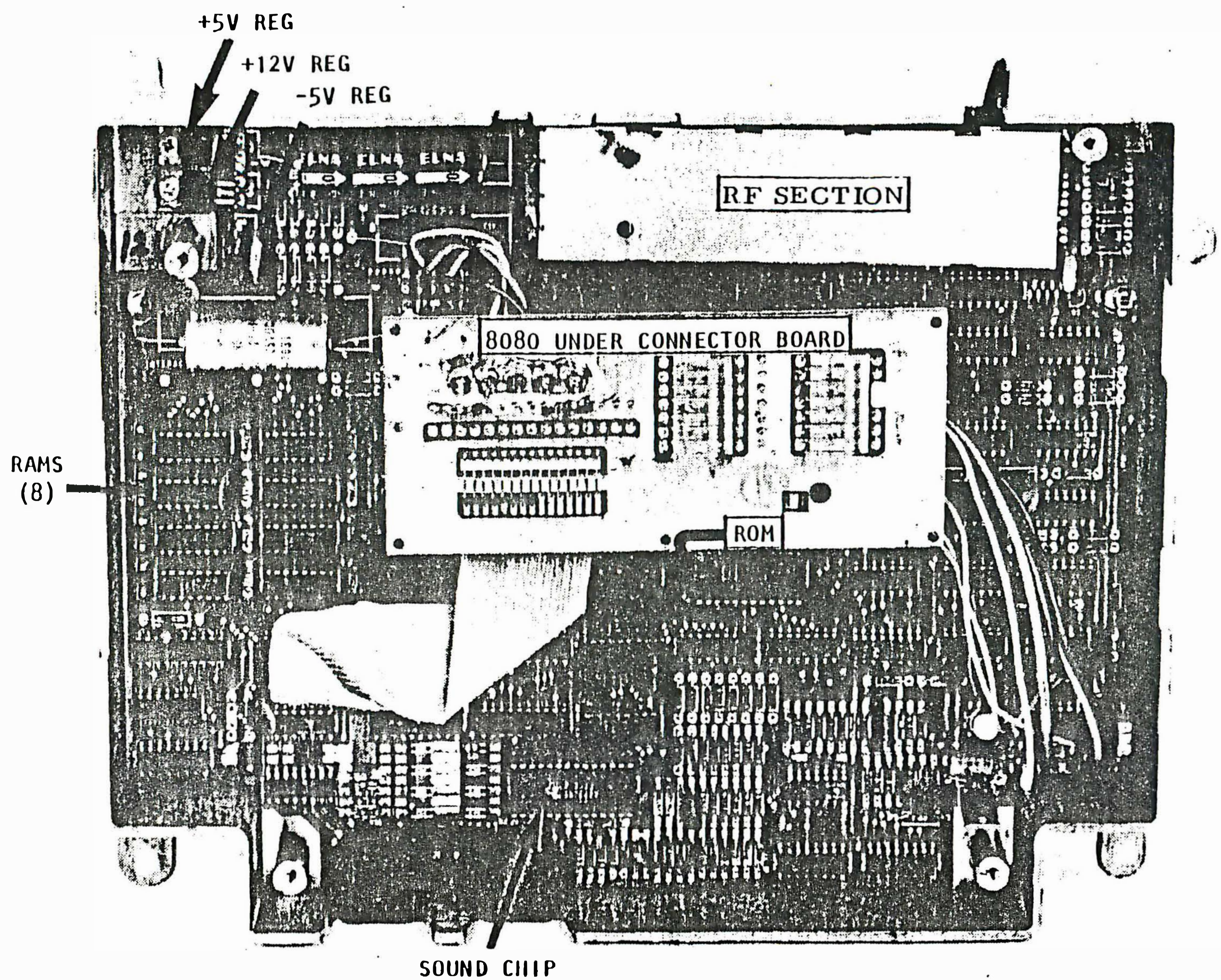


FIGURE 12--Main Electronics Sub-assembly - Top Plate Removed

Test Tape Instructions

The 8K and 16K Test Tapes contain integrated programs designed to thoroughly test the various subsystems of the Interact™ Model One Home Computer. The 8K and 16K Test Tapes differ only in the amount of random-access memory (RAM) they check. The 8K Test Tape does not check the upper 8K bytes of RAM when run on a 16K system. The 16K Test Tape indicates a "RAM ERROR" when run on an 8K system. Be sure to select the right Test Tape for the Model One you want to check.

Each Test Tape includes eight individual subsystem tests, a combined test and a memory exerciser for continuous testing of RAM ("burning in RAM"). The Model One must be connected to a color TV for the proper performance of these tests. See the Owner's Guide for instructions about how to connect the Model One to a TV set.

Loading the Test Tape

Both Test Tapes are loaded into the Model One in exactly the same way that any other program tape would be loaded. Turn the computer on, then initialize it by pressing the RESET switch. The message "DEPRESS L TO LOAD TAPE" or "DEPRESS L TO LOAD TAPE, R TO RESTART" should appear on the TV screen. If it does not, the Model One is defective and should be returned with a completed Factory Service Tag for service.

Place the appropriate Test Tape in the cassette drive and close the cover firmly. Depress the REWIND cassette button and type an "L" on the keyboard. Allow a few seconds for the tape to rewind, then depress the READ cassette button. In a few seconds you should hear

a 600 HZ leader tone followed by approximately one minutes of beeping noises from the loading program. After the tape has loaded the Model One waits for about two seconds, clears the screen, then displays the test menu shown below:

```
   F.A.S.T.
0=ROM CHECK
1=RAM CHECK
2=KBD CHECK
3=KEY CHECK
4=JOYSTK CHECK
5=SOUND CHECK
6=COLOR CHECK
7=R/W TAPE TEST
8=TOTAL CHECK
9=MEMEX
```

If you are unable to load the Test Tape, perform the Tape Head Alignment Procedure described in Section 6.0 of this service manual.

The purpose of each of the above tests is described in the following pages. To select a test, press the number from the above list which identifies the test you desire. The test begins automatically after you press a number on the keyboard.

Test 0: ROM CHECK

This test automatically checks the read-only memory (ROM) and its associated circuitry. A "checksum" is computed by adding together the contents of successive memory locations. The resultant sum is compared to a value contained in the ROM test program. If the computed checksum is correct the menu is again displayed on the screen. If the sum if incorrect the message "ROM ERROR" appears on the screen and remains for approximately two seconds before the menu is displayed again. If the ROM is faulty, replace the Main Electronics Sub-Assembly as described on page 15. Return the Main Electronics Sub-Assembly with a completed Factory Service Tag. No further tests can be performed if the ROM is not functioning properly.

Test 1: RAM CHECK

This test automatically checks the random-access memory (RAM) and its associated circuitry. The Model One writes four different data patterns into each RAM location then reads them back. If a data pattern is not read back correctly the message "RAM ERROR" appears on the screen for approximately two seconds, then the test menu is displayed again. If the correct data patterns are read back for each memory location, no message is displayed and the menu reappears on the screen. If the RAM is faulty, replace the Main Electronics Sub-Assembly as described on page 15. Return the Sub-Assembly with a completed Factory Service Tag. No further tests can be performed if the RAM is not functioning properly.

Test 2: KEYBOARD CHECK

This program, in conjunction with Test 3 below, checks each individual keyboard key and its associated circuitry. When this test is selected a pattern representing the keyboard with the appropriate symbol for each key is displayed on the screen. Proceed as follows:

1. Press the left Shift key, then the right Shift key.
2. Press the left corner of the space bar, then the right corner.
3. Press each remaining key on the keyboard one key at a time.

As each key is pressed its corresponding symbol on the screen is blanked out with a white square. During the keyboard check the operator should observe that the proper symbol is blanked out as each key is depressed. If a fault exists it is possible for the computer to read the wrong code for a key and therefore blank out the wrong symbol on the screen. This type of keyboard error can only be detected by observing that the proper symbol is blanked out as each key is depressed.

When all keys have been successfully read a two-second ringing noise can be heard, then the program returns to the test menu display. If a key or keys cannot be read they will remain displayed on the screen, indicating a keyboard failure. To return to the test menu display after noting any faulty keys, depress the RESET button, then type an "R". If the "R" key has failed, depress the RESET button and reload the appropriate Test Tape.

If the keyboard is faulty, replace the Control Panel Sub-Assembly as described on page 12. Return the faulty Control Panel with a completed Factory Service Tag.

Test 3: KEY CHECK

This test is used in conjunction with Test 2 above to verify proper operation of the keyboard. Begin by testing each single key on the following list. As each key is pressed a "beep" can be heard and the display appropriate for the key appears on the screen according to the list. Observe the display as each key is pressed, verifying that it matches the appropriate list entry. If the display is incorrect or if the pattern "blinks"--apears once and then disappears and reappears again--a keyboard failure may be assumed. After testing all single keys on the list, test the LOCK, SHIFT and CONTROL combinations on the list.

If you encounter a keyboard failure, note which keys or combinations have failed. Replace the Control Panel Sub-Assembly as described on page 12. Return the faulty Control Panel with a completed Factory Service Tag.

Screen Displays for Test 3: KEY CHECK

1. Single key displays:

KEY PRESSED	SCREEN DISPLAY[1]
2	10 32 2
3	27 33 3
4	26 34 4
5	25 35 5
6	24 36 6
7	23 37 7
8	22 38 8
9	21 39 9
zero	12 30 0
1	11 31 1
minus sign	15 2D -
plus sign	17 2B +
Q	51 71 Q
W	63 77 W
E	45 65 E
R	50 72 R
T	66 74 T
Y	61 79 Y
U	65 75 U
I	41 69 I
O	53 6F O
P	52 70 P
equal sign	35 3D =
CR	02 0D *
A	31 61 A
S	67 73 S
D	46 64 D
F	44 66 F
G	43 67 G
H	42 68 H
J	40 6A J
K	57 6B K
L	56 6C L
semi-colon	37 3B ;
asterisk	00 2A *
divide sign	13 2F /

[1] When some keys are pressed, the last symbol in the screen display is unrecognizeable. Such "garbage" symbols are denoted by an asterisk (*) in this list.

Single key displays (cont)

Z	60 7A Z
X	62 78 X
C	47 63 C
V	64 76 V
B	30 62 B
N	54 6E N
M	55 6D M
comma	16 2C ,
period	14 2E .
question mark	33 3F ?
space bar	01 20 *
backspace	04 08 *
lock	05 ? ?(2)

(2) The LOCK key display always begins with "LOCK 05". The two groups of numbers which follow may vary from test to test.

2. <u>LOCK key combinations</u>.

Before pressing the keys listed below, make sure the LOCK key is pressed and the word "LOCK" is displayed on the screen. "LOCK" remains displayed on the screen throughout this section of the Key Check test. The rest of the display varies according to the list below as each of the listed keys is pressed. After testing the keys listed below, depress the LOCK key again and the word "LOCK" should disappear from the screen.

KEY PRESSED	SCREEN DISPLAY
double quotation marks	10 22 "
single quotation mark	27 27 '
dollar sign	26 24 $
percent sign	25 25 %
exclamation point	24 21 !
colon	23 3A :
left parenthesis	22 28 (
right parenthesis	21 29)
"less than" sign	12 3C <
"greater than" sign	11 3E >
Underscore	15 5F _
Up arrow	17 5E ^

3. <u>Shift key Combinations.</u>

Test each of the keys listed below while holding down the Shift key. Do not use the LOCK key for this portion of the Key Check test. When you depress the Shift key, the word "SHIFT" is displayed on the screen and remains as long as you hold down the key. The rest of the display varies according to the list below. When you have tested all keys listed below, release the Shift key and the word "SHIFT" will disappear from the screen.

KEY PRESSED	DISPLAY
double quotation marks	10 22 "
single quotation mark	27 27 '
dollar sign	26 24 $
percent sign	25 25 %
exclamation point	24 21 !
colon	23 3A :
left parenthesis	22 28 (
right parenthesis	21 29)
"less than" sign	12 3C <
"greater than" sign	11 3E >
underscore	15 5F _
up-arrow	17 5E ^

4. Control key Combinations.

Test each letter on the keyboard while holding down the Control key. When you press the Control key, the word "CONTROL" appears on the screen and remains until you release the key. The rest of the display varies according to the list below. The asterisk (*) in the list below represents the unrecognizeable symbols printed at the end of each display.

KEY PRESSED	DISPLAY
Q	51 11 *
W	63 17 *
E	45 05 *
R	50 12 *
T	66 14 *
Y	61 19 *
U	65 15 *
I	41 09 *
O	53 0F *
P	52 10 *
A	31 01 *
S	67 13 *
D	46 04 *
F	44 06 *

Control key combinations (cont)

KEY PRESSED	DISPLAY
G	43 07 *
H	42 08 *
J	40 0A *
K	57 0B *
L	56 0C *
Z	60 1A *
X	62 18 *
C	47 03 *
V	64 16 *
N	54 0E *
B	30 02 *
M	55 0D *

After you have tested all keys in each list above, depress the "TAB" key. The entire screen should go blank, and the test menu should reappear on the screen. If the "TAB" key fails to clear the screen and return the menu a keyboard failure may be assumed. To return to the menu display in the event of a "TAB" key failure, depress the RESET button and press an "R". If both the "TAB" key and the "R" key have failed, depress the RESET button and reload the appropriate Test Tape.

Test 4. JOYSTICK CHECK

This test checks the operation of the joysticks and associated circuitry. During the test the screen displays two "barometer bars" representing the joystick potentiometer knob settings and two yellow squares representing the position of the joystick handles. The left display corresponds to the left joystick, the right display to the right joystick. (If you repeat the test a second time, the yellow squares and barometer bars will be black.) Testing should proceed as follows:

1. Slowly rotate the left joystick potentiometer knob. As the knob is rotated counter-clockwise, the left barometer should begin to fill in with yellow. When the knob is fully rotated in the counter-clockwise direction the entire bar should be yellow. When the knob is rotated clockwise the yellow barometer bar should fill in black. If the bar does not change colors as described, the potentiometer may be assumed defective.

2. Test the left joystick handle in each of the directions corresponding to up, down, left and right. For each direction, press the handle for a few seconds in that direction then release it to the center upright position. As you hold the joystick in a given position a small black square should appear in the yellow square, corresponding to the current position of the joystick. When the handle is returned to the center position the black square should turn white. If it does not, repeat the test for that direction. After two or three unsuccessful attempts the joystick may be assumed defective.

3. Now test the left joystick handle in each of the four diagonal directions corresponding to upper right, lower right, lower left and upper left, proceeding as outlined in step 2 above. Corresponding black squares should appear as described above, each turning white as the handle is released to the center position. After testing all eight directions only the center square should remain yellow. If not, attempt to change any remaining squares by moving the joystick handle in the appropriate direction. If you are still unable to change a square the joystick may be assumed defective.

4. Depress the fire button on the <u>left</u> joystick. The center square should turn white. If it does not, try the fire button two more times. If the center square remains yellow the fire button may be assumed to be defective.

5. Repeat the test for the <u>right</u> joystick, following steps 1 - 4 above. The joystick test ends automatically when both center squares have been changed to white. Therefore the operator should note any unchanged squares to record the nature of any joystick defect before pressing the hit button on the right joystick to whiten the last center square. If you are unable to change both center squares, signal that the test is complete by pressing the RESET button. Then press an "R" to make the test menu appear again. If either of the joystick controls fails, try the test again with a new joystick. If a new joystick also fails, replace the Main Electronics Sub-Assembly as described on page 15. Return the faulty sub-assembly with a completed Factory Service Tag.

Test 5: SOUND CHECK

This test checks the audio subsystem of the Model One computer. The computer displays "PRESS * FOR SOUND TEST" on the screen. When the "*" key is pressed five sounds are heard in succession. They are:

1. High hardware tone (varies around 800 HZ)
2. High software tone (about 800 HZ, usually a little higher than sound 1)
3. Low hardware tone (about 70 HZ)
4. Low software tone (about 35 HZ)
5. Short "gunshot" hardware sound

Sound system failure is evidenced by:

1. No sound at all
2. Fewer than five sounds
3. Hardware sounds buzzy or harsh compared to software sounds
4. Sound 1 very different in pitch from sound 2.
5. Sound 3 very different in pitch from sound 4.

After the five sounds are produced the test menu reappears on the screen. The operator should note any sound system failures before proceeding to the next test. If you encounter a sound system failure, replace the Main Electronics Sub-Assembly as described on page 15. Return the faulty sub-assembly with a completed Factory Service Tag.

Test 6: COLOR CHECK

This test checks the color generation circuitry of the Interact system. When this test is selected the following message appears on the screen:

PRESS:

S 1 8 ? F

As each of the keys S, 1, 8, ? and F is depressed the background color of the screen changes to red, green, yellow, cyan and magenta respectively. The order in which the keys are pressed is unimportant. At the same time a key is pressed it is blanked out from the screen display. When a color is chosen a message appears at the bottom of the screen indicating what color is being displayed. Some TV's will require adjustment of the "HUE" control to display all colors properly. If you are unable to adjust to the proper colors, repeat the Color Check with a different TV.

If you are still unable to adjust to the proper colors the color generation circuitry may be assumed defective. Replace the Main Electronics Sub-Assembly as described on page 15. Return the faulty sub-assembly with a completed Factory Service Tag.

The last color display chosen remains for about two seconds, then the test automatically terminates and the menu reappears on the screen.

Test 7: READ/WRITE TAPE TEST

This test checks the ability of the Model One to read and write data patterns using the cassette tape. Self-explanatory instructions for performing this test are displayed on the screen as the test proceeds. Follow each instruction as it is displayed. You will need a blank Data Tape. During the test, the computer writes a random data pattern on the tape. Then the pattern is read back from the tape to verify proper operation of the cassette deck. If the test is performed correctly the computer displays the message "TAPE OK". If the data are read or written incorrectly the computer displays "TAPE ERROR". When the test has been completed the test menu automatically reappears on the screen.

In the event of a tape error, try the Tape Test again using a different Data Tape. If a tape error occurs using the new tape, replace the Cassette Sub-Assembly as described on page 12. Return the faulty sub-assembly with a completed Factory Service Tag.

Test 8: TOTAL CHECK

This test combines the first seven tests. Tests are automatically performed in numerical order as listed on the test menu. The total check eliminates the need to select each test separately from the menu. Follow the instructions above for each test as it is run.

Test 9: MEMORY EXERCISER

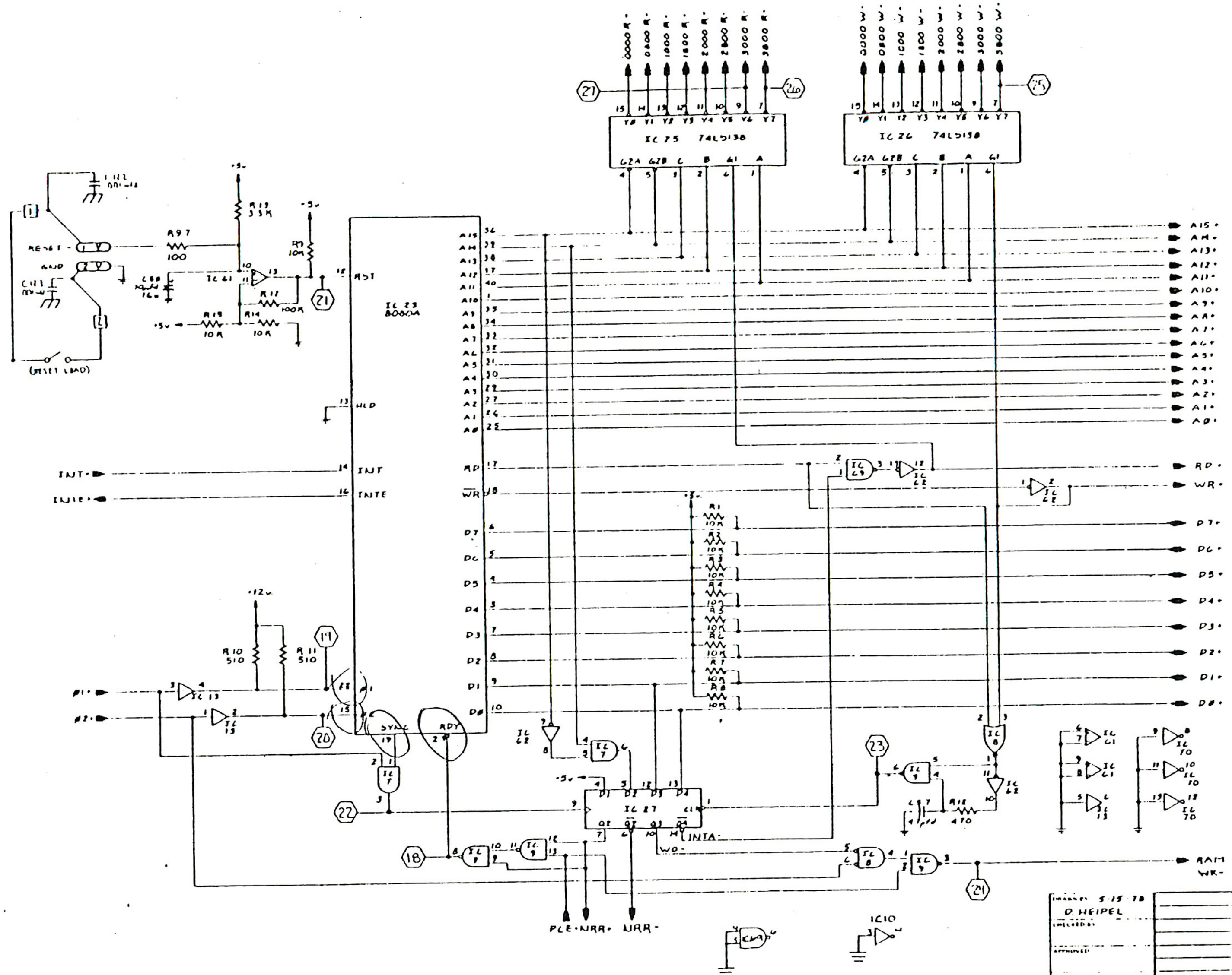
NOTE: This test destroys the contents of RAM. The Test Tape will have to be reloaded to perform any other test following the Memory Exerciser test.

This program exercises the RAM extensively, looking for address, data, and data/address pattern-related faults. If a RAM failure is encountered the screen blanks then turns red and the program halts. If no errors are encountered the test runs continually and therefore also serves as a method for "burning in" units which have had memory repairs or conversions. After five minutes of successful operation you may assume that the RAM and associated circuitry are functioning properly. However, two or more hours of continuous successful operation is recommended when using this test to burn in units.

INTERACT MODEL ONE

SCHEMATICS

LTR	DESCRIPTION	DATE	APPROVED
	REL FOR PROD.		



IC71	74LS00	7	14			
IC67	4069	7				14
IC65	7905					
IC63	7805					
IC61	LM3302	12	3			
IC59	2316E	12	24			
IC57	LM1889	5				
IC55	74LS153	8	16			
IC53	74LS374	10	20			
IC51	74LS175	8	16			
IC49	4115	16	9	8	1	
IC47	4115	16	9	8	1	
IC45	4115	16	9	8	1	
IC43	4115	16	9	8	1	
IC41	74LS153	8	16			
IC39	74LS153	8	16			
IC37	74LS256	8	16			
IC35	76477	2	15			
IC33	74LS393	7	14			
IC31	74LS138	8	16			
IC29	MA9708	6		14		
IC27	74LS175	8	16			
IC25	74LS138	8	16			
IC23	8080A	2	20	28	11	
IC21	74LS279	8	16			
IC19	74LS393	7	14			
IC17	74LS393	7	14			
IC15	74LS195	8	16			
IC13	7407	7	14			
IC11	74LS04	7	14			
IC9	74LS00	7	14			
IC7	74LS08	7	14			
IC5	74LS32	7	14			
IC3	74LS10	7	14			
IC1	74LS11	7	14			
REF	TYPE	GND	+5	+12	-5	+8

IC30	7406	7	14			
IC68	4081	7				14
IC66	74LS374	10	20			
IC64	7812					
IC62	74LS04	7	14			
IC60	LF356		7		4	
IC58	2316E	12	24			
IC56	74LS153	8	16			
IC54	74LS374	10	20			
IC52	74LS153	8	16			
IC50	74LS374	10	20			
IC48	4115	16	9	8	1	
IC46	4115	16	9	8	1	
IC44	4115	16	9	8	1	
IC42	4115	16	9	8	1	
IC40	74LS153	8	16			
IC38	74LS153	8	16			
IC36	74LS256	8	16			
IC34	74LS374	10	20			
IC32	74LS197	10	20			
IC30	74LS373	10	20			
IC28	74LS153	8	16			
IC26	74LS138	8	16			
IC24	74LS14	7	14			
IC22	74LS138	8	16			
IC20	74LS74	7	14			
IC18	74LS73	11	4			
IC16	74LS92	10	5			
IC14	7406	7	14			
IC12	74LS08	7	14			
IC10	74LS04	7	14			
IC8	74LS02	7	14			
IC6	74LS00	7	14			
IC4	74LS10	7	14			
IC2	74LS20	7	14			
REF	TYPE	GND	+5	+12	-5	+8

DRAWN 5-15-78 D. HEIPEL
CHECKED
APPROVED

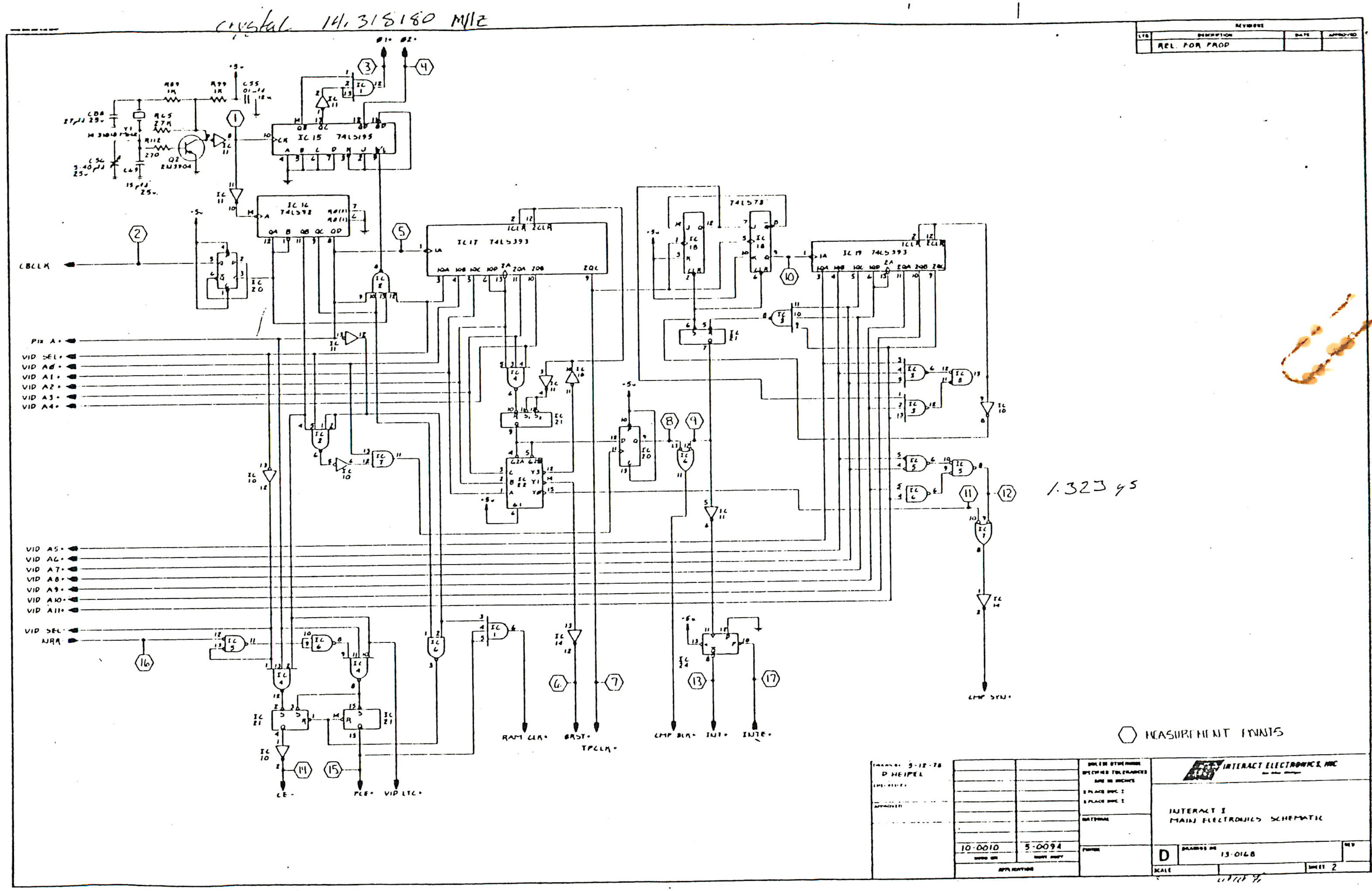
10-0010 NEXT ASSY | 5-0094 USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE IN INCHES
2 PLACE DEC ±
3 PLACE DEC ±
MATERIAL
FINISH

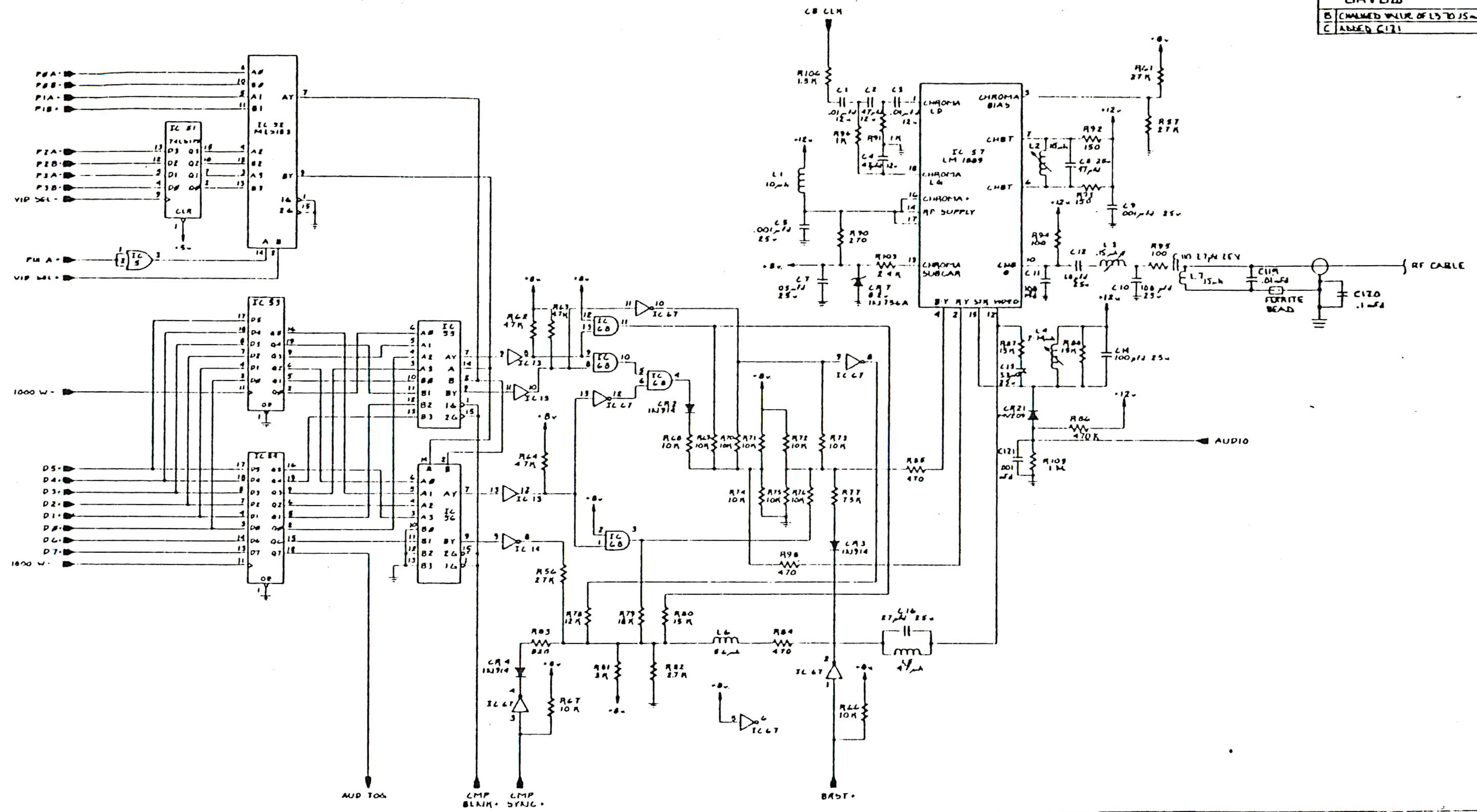
INTERACT ELECTRONICS, INC

INTERACT I
MAIN ELECTRONICS SCHEMATIC

SIZE D | DRAWING NO. 13-0168 | REV
SCALE | SHEET 1 OF 6


crystal 14.318180 MHz
1.323 μs
MEASUREMENT POINTS
CBCLK
VID SEL
VID A0
VID A1
VID A2
VID A3
VID A4
VID A5
VID A6
VID A7
VID A8
VID A9
VID A10
VID A11
NRR
RAM CLK
BRST
TPCLK
CMP BLK
INT
INTE
CMP SYN
CE
PCE
VID LTC
IC 15 74LS195
IC 16 74LS92
IC 17 74LS393
IC 19 74LS393
74LS73
Q2 2N3904
REL. FOR PROD
INTERACT ELECTRONICS, INC
INTERACT I
MAIN ELECTRONICS SCHEMATIC
D. HEIPEL
10-0010
5-0094
13-0168
SHEET 2

LTR	DESCRIPTION	DATE	APPROVED
	REL. FOR PROD		
A	CHANGED C10 (C11) TO 100 MFd & ADDED C119 & C120	8-24-78	
B	CHANGED VALUE OF L3 TO 15	8-28-78	
C	ADDED C121	9-1-78	



DRAWN BY 8-17-78 D HEIPEL

CHECKED BY

APPROVED

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE IN INCHES

MATERIAL

FINISH

USED ON	NEXT ASSY
10-0010	5-0094

APPLICATION

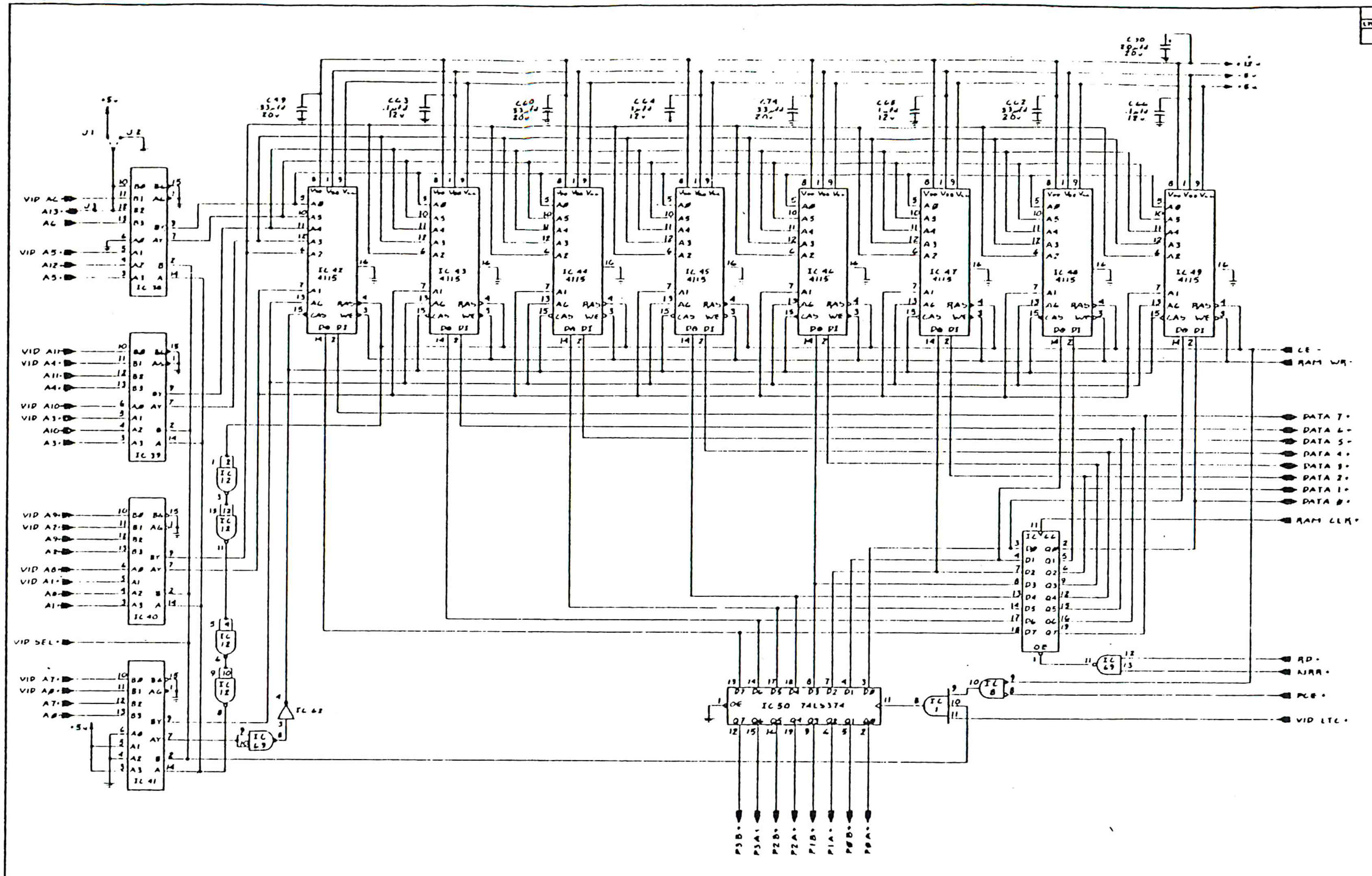
INTERACT ELECTRONICS, INC.

INTERACT I
MAIN ELECTRONICS SCHEMATIC

D | DRAWING NO. 13-0168 | REV. C

SCALE | SHEET 3

W.W.F.



REV	DESCRIPTION	DATE	APPROVED
	REL FOR PROD		

DRAWN BY 5-22-78 D HEIPEL

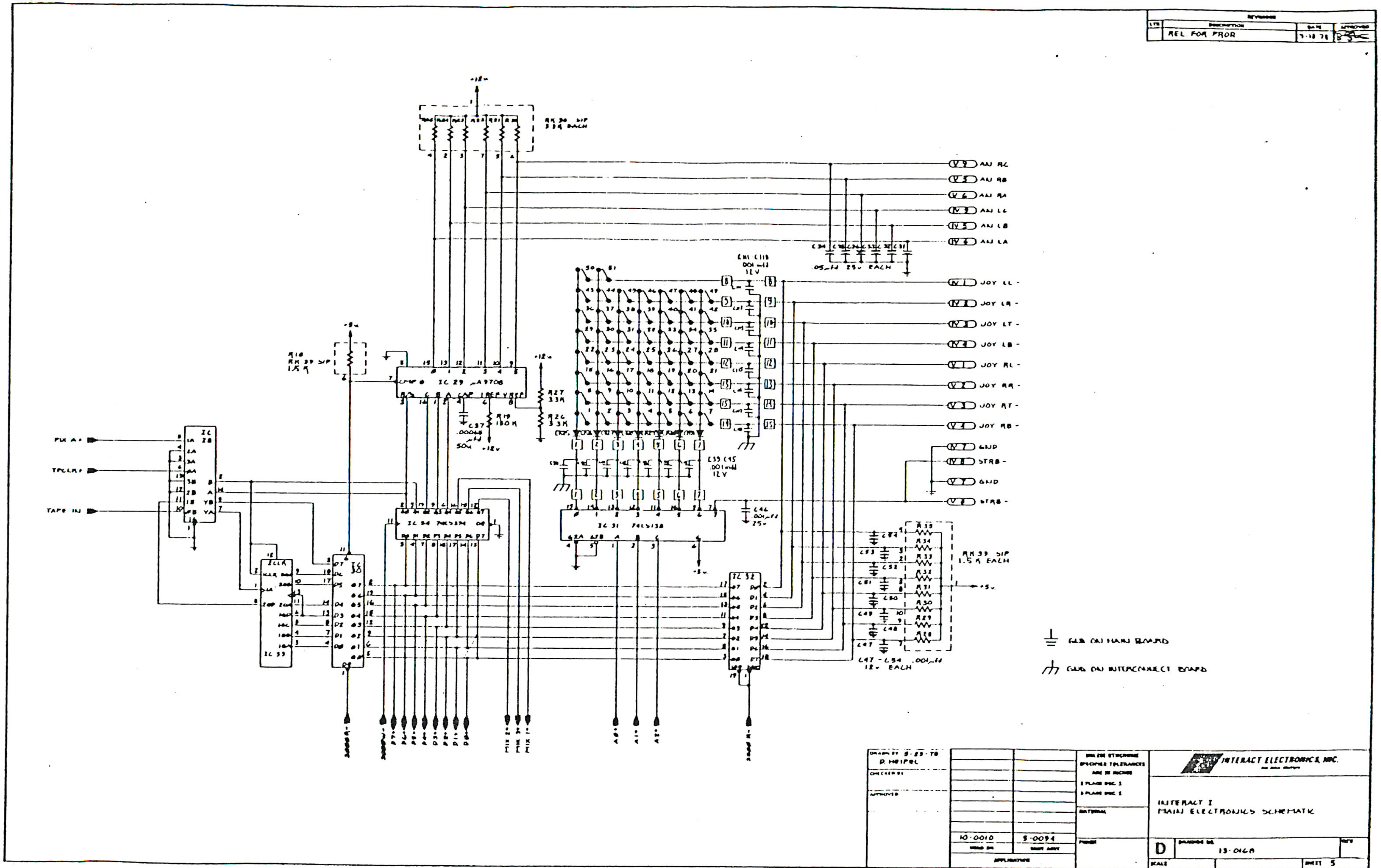
10-0010 | 5-0094

APPLICATION

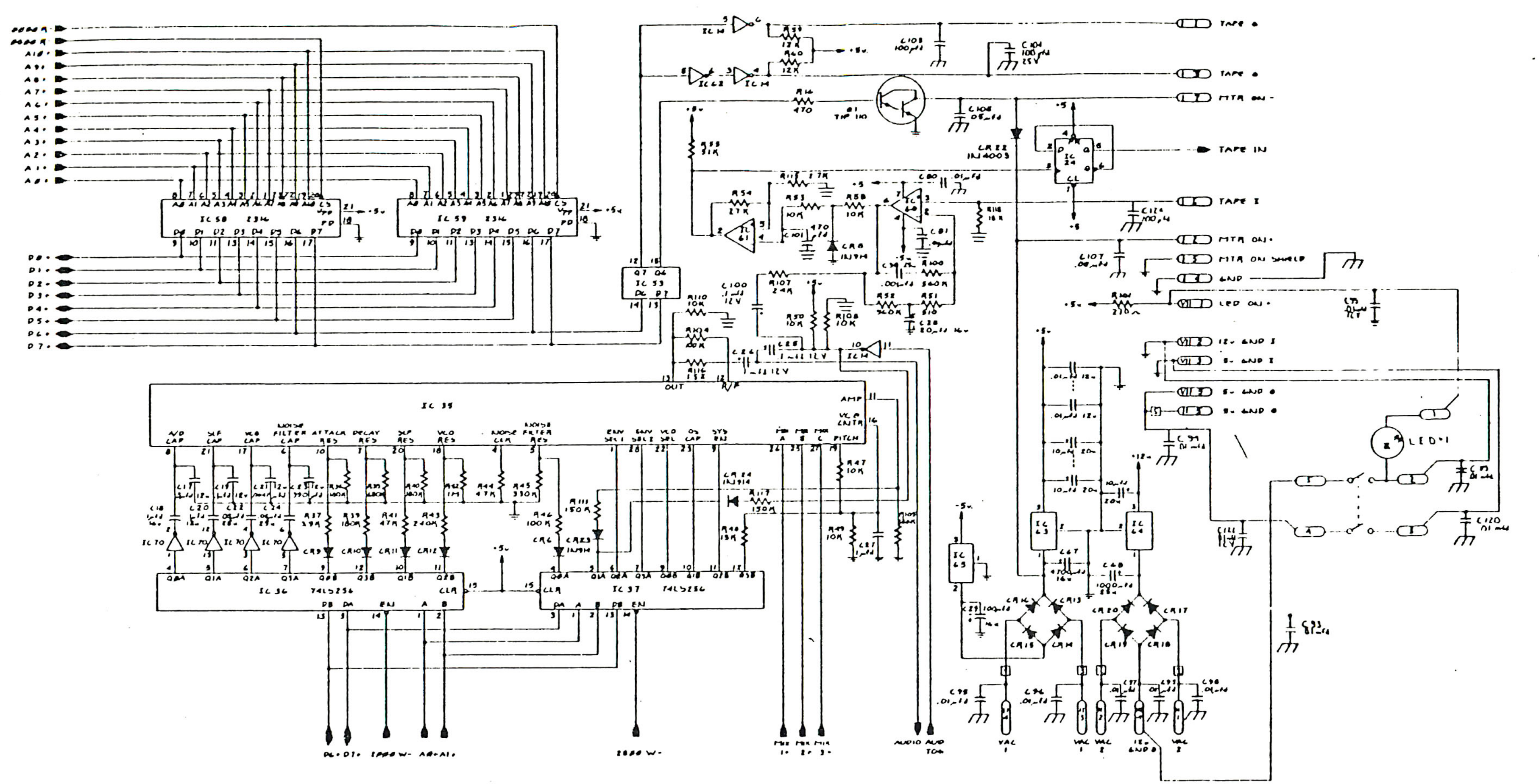
INTERACT ELECTRONICS, INC.

INTERACT I
MAIN ELECTRONICS SCHEMATIC

D | DRAWING NO 13-0168 | SHEET 4



REL FOR PROR
7-10-78
IC 29 μA9708
IC 34 74C374
IC 31 74LS138
IC 32
IC 33
IC 28
RK 30 SIP 33K EACH
RK 39 SIP 1.5K EACH
R27 33K
R26 33K
R19 180K
C37 .0068 μf 50V
C46 .001 μf 25V
C41 C118 .001 μf 12V
C39 C45 .001 μf 12V
.05 μf 25V EACH
C47 - C54 .001 μf 12V EACH
AN RC
AN RB
AN RA
AN LC
AN LB
AN LA
JOY LL -
JOY LR -
JOY LT -
JOY LB -
JOY RL -
JOY RR -
JOY RT -
JOY RB -
GND
STRB -
GND
STRB -
PIX A+
TPCLK+
TAPE IN
+12V
+5V
GND ON MAIN BOARD
GND ON INTERCONNECT BOARD
DRAWN BY 8-29-78 D. HEIPEL
10-0010
5-0094
INTERACT ELECTRONICS, INC.
INTERACT I
MAIN ELECTRONICS SCHEMATIC
D
13-016A
SHEET 5



LTR	DESCRIPTION	DATE	APPROVED
	REL. FOR PROD.		
A	C20 CHANGED TO 1µf FROM .1µf	9-1-79	B

⏚ GROUND ON MAIN BOARD

⏚ GROUND ON INTERCONNECT BD

DRAWN BY 3-28-78 D HENSEL

INTERACT ELECTRONICS, INC.

INTERACT I
MAIN ELECTRONICS SCHEMATIC

10-0010 | 5-0094

D | DRAWING NO. 13-0168 | REV A

SHEET 6

(6-7) 8 V

4 Amp 7 VOLT 4A 7-12

120 ΩR

SI/P.T.S. 2

10 C - 500 Cure

WW.F.

I. Memory - I/O Map

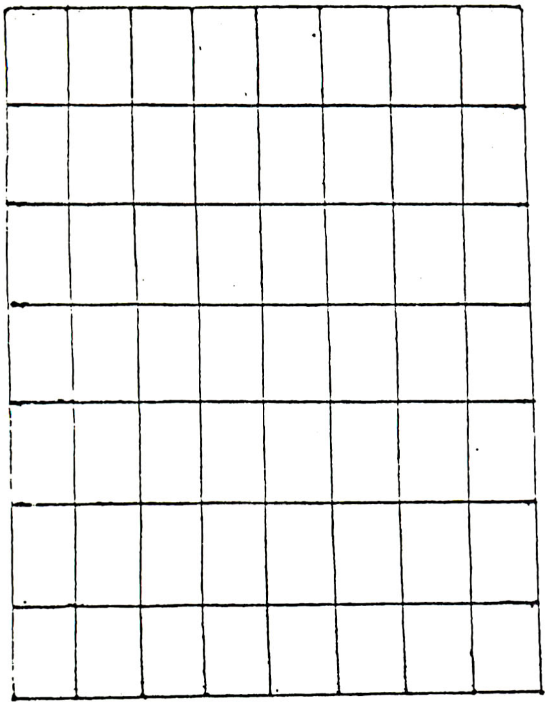
A. Pages

Address	Contents	Page
0000H	2-4 Kb ROM System I/O	Page 0
4000H	8-16 Kb Resident System RAM	Page 1
8000H	16 Kb Expansion RAM	Page 2
1000H	16 Kb Expansion RAM	Page 3

B. Page 0 - System ROM - I/O Map

1. Memory Read

Address	Contents
0000H	ROM A
0800H	ROM B
1000H	Spare
	Spare
2000H	Spare
2800	Spare
3000H	RTC-A/D Data
3800H	KBD-JSTK Data
4000H	



00_H – $FFFF_H$ 8080

00 – 7FFF INT

4000 – 7FFF RAM 16K

4000 – 49FF SCREEN

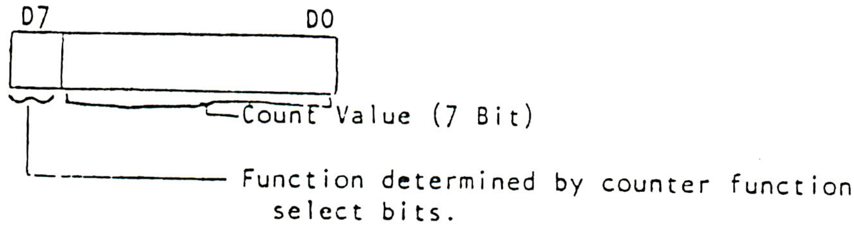
4A00 – 4C00 SPARE

5F80 – 5FFF STACK & VARIABLE LEAVE IT 8[illegible]

4C00 – 5F7F USABLE RAM.

4C00 – 5F7F →

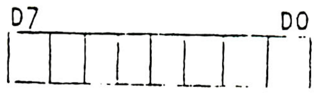
2. RTC - A/D Data (Read @ 3000H)



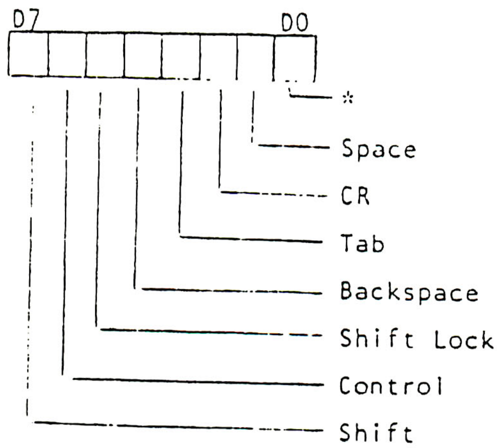
D7 & D6 of misc. output (3000H)

a. 0 = no tape flux change when D7 & D6 = 00
   1 = tape flux change when D7 & D6 = 00

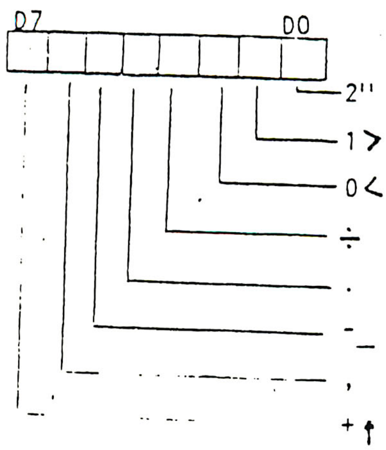
3. Keyboard - Joystick Data (Read @ 3800-3807H)



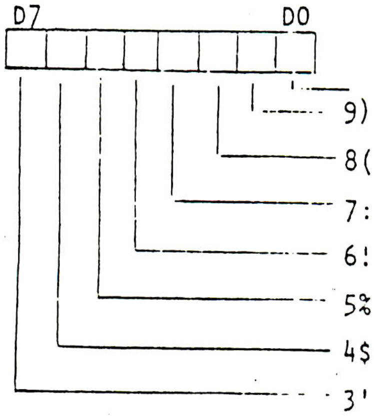
a. Read @ 3800H



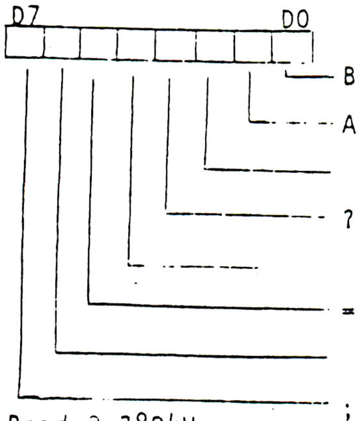
b. Read @ 3801H



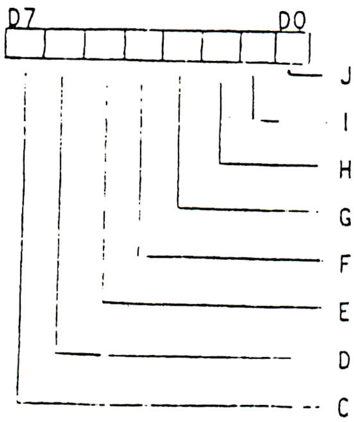
c. Read @ 3802H



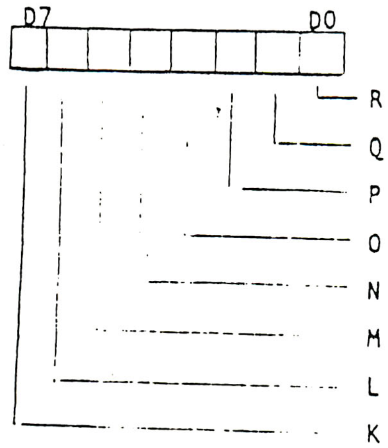
d. Read @ 3803H



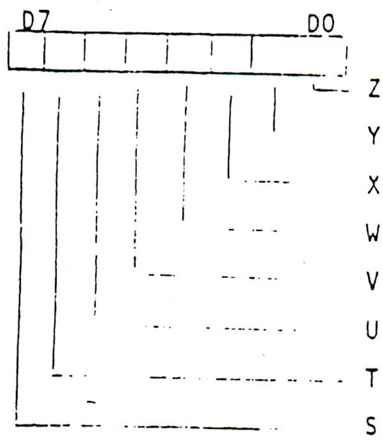
e. Read @ 3804H



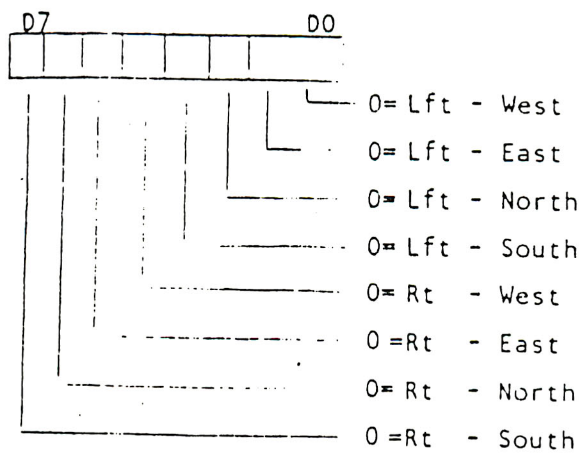
f. Read @ 3805H



g. Read @ 3806H



h. Read @ 3807H



4. Memory Write

a. Color Register A (1000H)

D7			D0
TO	TM	C10	C00

- C00 — Color Register 00 Where:
  - 000 = Black
  - 001 = Red
  - 010 = Green
  - 011 = Yellow
  - 100 = Blue
  - 101 = Magenta
  - 110 = Cyan
  - 111 = White
- C10 — Color Register 10 - Same as C00
- TM — Tape Motor Control - 1 = On, 0 = Off
- TO — Tape Output
  Data to Tape

b. Color Register B (1800H)

D7			D0
SS	I	C11	C01

- C01 — Color Register 01 - Same as C00
- C11 — Color Register 11 - Same as C00
- I — Intensity - Affects color C10
  - 1 = Color 10 1/2 intensity
  - 0 = Color 10 normal
- SS — Software sound - Toggled by cpu to create desired tone

c. Sound Register A (2000H - 2003)

D7 ... D0

*2000H | D7 | D6 | X X X X X X |

Attack Registor
- 0 = 3.9 K
- 1 = 180 K

Attack Decay Capacitor
- 0 = .5 mfd
- 1 = 1.5 mfd

Attack
- 00 = 1.95 MS
- 01 = 5.85 MS
- 10 = 90 MS
- 11 = 270 MS

Decay
D7 (D6 of 2003H)

(C)	(R)	
0	0	= 21 MS
0	1	= 340 MS
1	0	= 213 MS
1	1	= 1020 MS

D7 ... D0

*2001H | D7 | D6 | X X X X X X |

SLF Resistor
- 0 = 37 K
- 1 = 180 K

SLF Capacitor
- 0 = .1 mfd
- 1 = 1.1 mfd

- 00 = 173 H
- 10 = 35 Hz
- 01 = 16 Hz
- 11 = 3 Hz

D7 ... D0

*2002H | D7 | D6 | X X X X X X |

VCO (voltage controlled osc.) register
- 0 = 12 K
- 1 = 330 K

- 00 = 10,667 Hz
- 01 = 388 Hz

VCO Capacitor
- 0 = .005 mf
- 1 = Not Used

D7 ... D0

*2003H | D7 | D6 | X X X X X X |

Decay Resistor
- 0 = 142 K Fast
- 1 = 680 K Slow

Noise Filter Capacitor
- 0 = 390 pfd white noise
- 1 = .01 mfd pink noise

d. Sound Register B (2800H-2803)

```
         D7                    D0
*2800H  | D7 | D6 | X X X X X X |
              |    |
              |    +------------ VCO Select
              |                    0 = External voltage source
              |                    1 = SLF
              +----------------- Noise Filter Resistor
                                   0 = 77 KΩ
                                   1 = 330 KΩ

         D7                    D0
*2801H  | D7 | D6 | X X X X X X |
              |    |
              |    +------------ One shot sound terminated
              |                    0 = sound/enable attack
              |                    1 = begin decay
              +----------------- Volume
                                   0 = Normal Volume
                                   1 = 1/2 Volume

         D7                    D0
*2802H  | D7 | D6 | X X X X X X |
              |    |
              |    +------------ System enable
              |                    0 = enabled *
              |                    1 = inhibited
              +----------------- Envelope select 1

         D7                    D0
        | D7 | D6 | X X X X X X |
              |    |
              |    +------------ VCO Ext. control
              |                    0 = f↑
              |                    1 = f↓
              +----------------- Envelope select 2
```

*A one to zero transition triggers the one shot to begin the attack with bit D6 in 2801H set to 0.

* Envelope Select

ES2	ES1	
0	0	= VCO
0	1	= One Shot
1	0	= Mixer Only
1	1	= VCO With Alternating Cycles

e. Miscellaneous Output Register (3000H)

D7 D0

Audio Mixer Select:

000 = VCO

001 = Noise

010 = SLF/Noise

011 = SLF/VCO

100 = SLF

101 = VCO/Noise

110 = SLF/Noise/VCO

111 = Tape Sounds to Audio

A/D Channel:

000 = Ground				
001 = ANLA -	Analog Left	A	Fire Button
010 = ANLB -	" "	B	Potentiometer
011 = ANLC -	" "	C	Spare
100 = ANRA -	Analog Right	A	Fire Button
101 = ANRB -	" "	B	Potentiometer
110 = ANRC -	" "	C	Spare
111 = VREF			

For tape write, set bits to VREF

Counter Function:

00 = Tape input select

10 = A/D start conversion

11 = No function

01 = A/D reset counter

A/D Conversion Sequence of Events

1) out D7, D6 = 01, A/D Sel, Reset

2) wait 40 uS

3) out D7, D6 = 10, A/D Sel, Release, Reset

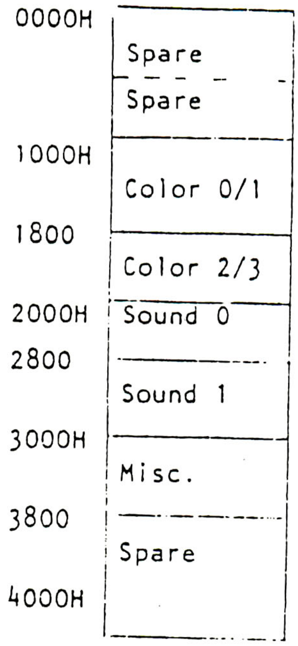
4) wait, 240 uS

5) read counter

0 = 0.0V

255 = 11.95V

f. Memory Write



5. Page 1 - System RAM

a. Video RAM

b. Program RAM

c. Optional Program RAM

